GREATER TORONTO AREA

3Rs ANALYSIS

SERVICE TECHNICAL

APPENDIX

FINAL - MAY 1994

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SERVICE TECHNICAL APPENDIX

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for
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FINAL - MAY 1994

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1.0 INTRODUCTION

1.1 Background

In 1989, the government of Ontario announced its commitment to meeting a Provincial target of at least 50% reduction of waste going to landfills and incineration by the year 2000. This target, a waste diversion target to be achieved through waste reduction, reuse and recycling (the 3Rs) was confirmed by the present government in 1990.

To facilitate the achievement of the 50% target, the Province introduced the *Waste Management Act, 1992*. The Act broadens the government's powers to reduce waste sent to disposal through a variety of means. It also vests powers in the Interim Waste Authority (IWA), an agency created to ease the waste disposal crisis in the Greater Toronto Area (GTA). The IWA is complying with its mandate by conducting environmental assessments to locate three, long-term landfill sites in the GTA.

The GTA Regional Municipalities of Peel and Durham are each defined for the IWA process as separate "primary service areas". Metropolitan Toronto and the Regional Municipality of York have been defined as a separate combined primary service area. Each of the three defined primary service areas is proposed to receive one new landfill facility identified through the IWA's process. The fifth GTA Regional Municipality, Halton, has already obtained approval for a landfill site and thus is not part of the present siting process.

1.2 Purpose of Study

This study has two purposes, each of which relates directly to a requirement created by the *Waste Management Act*.

The first requirement pertains to waste estimates. Section 14 of the *Waste Management Act* requires the Minister of Environment and Energy to provide a written estimate as to:

a) *the amount of waste that would otherwise be expected to be generated in the primary service area (i.e. each of Peel, Durham and Metro/York) during a twenty-year period that will not be generated because of waste reduction efforts; and*

b) *the amount of waste that will be generated in the primary service area during a twenty-year period that will not need to be disposed of in the site because of the reuse or recycling of materials that are or could become waste.*

These waste estimates were provided to the IWA by Minister's letter dated May 15, 1992. A copy of this letter is presented in Appendix A to the EA Input Document. The GTA 3Rs Analysis study provides additional analysis of 3Rs activities, in support of the reasonableness of the waste diversion estimates previously provided.

The second requirement pertains to analyzing the 3Rs as "alternatives to" landfill waste disposal sites. Section 15 of the *Waste Management Act* requires that the IWA environmental assessments contain a description of, and statement of rationale for the 3Rs, as well as evaluate matters relating to the 3Rs as an alternative to the landfill waste disposal sites. By administrative agreement, MOEE committed to provide such a rationale and evaluation to the IWA for use in its environmental assessments. The GTA 3Rs Analysis fulfils this second requirement.

A number of parameters guided the completion of the GTA 3Rs Analysis. The study parameters are as follows:

- The study area for the GTA 3Rs Analysis is the area encompassing Metro Toronto and the Regional Municipalities of Durham, York, Peel and Halton. Metro Toronto/York Region, Durham Region and Peel Region are defined in the *Waste Management Act* as the "primary service areas" for the purpose of establishing landfill sites. The Region of Halton has been included as part of the GTA 3Rs Analysis study area as it is part of the GTA. It is not, however, one of the "primary service areas". Thus, 3Rs systems have not been developed and evaluated for Halton Region.

- The MOEE is <u>not</u> the proponent or co-proponent of any 3Rs systems discussed in this study. The study provides additional analysis of 3Rs activities and supplemental data on waste diversion estimates for use by the IWA.

- As stated Section 15(2) of the *Waste Management Act,*

  The environmental assessment is not required to contain any description of or statement of the rationale for, or any description or evaluation of any matter relating to,

  a) an alternative of waste reduction or reuse or recycling if that alternative would involve incineration of waste or the transportation of waste from the primary service areas to any other area for disposal; or

  b) an alternative of some other single landfill waste disposal site if the capacity of the other site would appear to be inadequate in view of the estimate provided under Section 14.

- The *Waste Management Act*, 1992, specifies that the IWA landfills are to operate for a minimum of 20 years.

1.3 Study Approach

The GTA 3Rs Analysis identifies and assesses alternative 3Rs systems, composed of combinations of 3Rs programs, technologies and practices, that could reasonably be implemented in the GTA. In this report, this range of reasonable approaches to 3Rs are termed 3Rs systems alternatives. It also determines the potential for each 3Rs system to divert waste over the twenty-year minimum life expectancy of the GTA landfill sites, and identifies the environmental net effects of each system.

For purposes of the present analysis, an array of conceptually different 3Rs systems have been identified for addressing residential wastes, as well as for industrial commercial, and institutional (IC&I) wastes. For each system, estimates of the amount of waste the system could potentially divert from disposal have been determined. An assessment, done on a non-site-specific, generic level and documented in this report, identifies the net effects to the environment of each potential 3Rs system, in keeping with the *Environmental Assessment Act*.

In conducting the 3Rs work, and providing estimates of waste that will not require disposal in the IWA established sites, MOEE is acting as a reliable authority in accordance with its legislative mandate. The alternatives presented in this report are not in any way structured as detailed implementation plans for the Regions or the private sector.

1.4 Purpose of the Service Assessment and Study Objectives

This Technical Appendix documents the service input into the GTA 3Rs analysis. Service effects in this study are defined as potential for alterations to waste disposal (due to changes in waste generation, composition or disposal) which may occur as a result of the implementation of a 3Rs system within each of the four Regional municipalities (Durham, Metro Toronto, York and Peel). The results of this assessment serve as input into the overall 3Rs system evaluation.

The study objectives of the service assessment are as follows:

- Identification of existing waste management and diversion systems in each of the four regional municipalities;
- Prediction of service (waste generation, composition and diversion) effects as a result of implementation of any of the alternative 3Rs systems within each of the four Regional municipalities;
- Analysis of the potential effects on service, including the development of mitigation measures for the purposes of identifying net effects;
- Ranking the systems of the four Regional municipalities from the perspective of service.

1.5 Outline of Report

Chapter 2 presents the study approach followed in the Service assessment.

Chapter 3 describes the system development approach used in the study.

Chapter 4 presents residential waste generation estimates and projections, as well as waste composition estimates for the Regions of Durham, Metro Toronto, York, Peel and Halton.

Chapter 5 provides a description of the six residential waste diversion systems evaluated in the study and the methodology and assumptions used to develop waste diversion estimates for each system.

Chapters 6 - 10 describe the residential waste diversion systems and estimated diversion impacts of each system when applied to the Regions of Durham, Metro, York, Peel and Halton, respectively.

Chapter 11 presents waste generation and composition estimates for the IC&I sector in the GTA.

Chapter 12 describes the six waste diversion systems for the IC&I sector and provides estimates of waste diversion achievable by each of the systems, on a GTA-wide basis.

Chapter 13 presents the net effects analysis process undertaken by the Service discipline. A technical ranking of systems, from highest ranked to lowest ranked, is presented for each service criterion, and for the service discipline as a whole. The six systems are evaluated for the residential sector on a region by region basis and for the IC&I systems on a GTA-wide basis.

Chapter 14 presents a summary of the net effects analysis for residential and IC&I systems.

Chapter 15 presents possible waste diversion impacts that could be achieved through different combinations of residential and IC&I systems for the Regions of Durham, Metro Toronto, York and Peel, for the years 1996 to 2015.

2.0 APPROACH

This section outlines the approach used to identify potential effects of different residential and IC&I 3Rs systems by the Service Discipline.

2.1 Overview

The GTA 3Rs Analysis assessed six residential and six IC&I waste diversion systems. The six residential systems are:

System 1	-	Existing;
System 2	-	Existing/Committed;
System 3	-	Direct Cost;
System 4	-	Expanded Blue Box;
System 5	-	Wet/Dry;
System 6	-	Mixed Waste Processing.

The six IC&I systems are:

IC&I System 1	Existing;
IC&I System 2	Existing/Committed;
IC&I System 3	Extended 3Rs Regulations;
IC&I System 4	Expanded 3Rs Regulations;
IC&I System 5	Expanded 3Rs Regulations with Organics;
IC&I System 6	No Unprocessed Waste to Landfill.

A description of the process used to develop these systems is presented in Chapter 3 of this Appendix. Descriptions of the residential systems are presented in Chapter 5. The components of the residential systems are presented in a series of tables contained in Chapters 6 to 10. Descriptions of the IC&I systems are presented in Chapter 12, along with a table summarizing the components of each IC&I system.

Each of six residential and six IC&I waste diversion systems were studied in a "Net Effects Analysis". This involved a systematic analysis of each component of each system according to the criteria groups and the indicators discussed in the next section of this chapter. Residential systems were analysed on a region by region basis while the IC&I systems were analysed at the GTA-wide level. A technical ranking for the Service Criteria Group, from highest to lowest, was provided for each system. This technical ranking was carried out by region for the residential systems, and for the GTA as a whole for the IC&I systems.

The cumulative diversion impacts of combinations of residential and IC&I systems over the 20 year period from 1996 to 2015, taking source reduction impacts into account, are estimated for the Regions of Durham, Metro Toronto, York and Peel.

Information on which the effects of each system and component were estimated were obtained from a number of sources, including available data on the effects currently experienced by residential and IC&I systems in the GTA. A telephone and mail survey was carried out at the beginning of the project to obtain information on existing diversion programs in each of the GTA lower and upper tier municipalities. A survey of IC&I associations was carried out to collect the same information for the IC&I sector. An extensive literature review was also conducted to identify operating experience on 3Rs programs from other jurisdictions across Canada, the US, and Europe. Where GTA data were not available on the effects of a particular 3Rs component, information was obtained from other North American programs.

2.2 Impact Assessment Criteria

The six residential and IC&I systems were analysed by the Service discipline using four criteria. These were:

- performance;
- reliability;
- social acceptability and
- flexibility.

Table 2.1 presents the indicators used for each of these four criteria groups, along with a definition of the indicators, and a rationale for choosing the indicators.

Performance of components and systems focusses on the rate of diversion achieved, measured as the percentage of the waste stream generated which is not disposed. Information on the diversion achieved by various components and systems in GTA and elsewhere was used to assess the diversion (performance) reasonably achievable by the components and systems evaluated.

Flexibility of a component or system focusses on the range and quantity of wastes it can divert. Information from a number of programs, and an asessment of the technology involved was used to assess the flexibility of each component and system.

Reliability of a system focusses on the level of confidence that a component or system will perform its function, and divert waste on a consistent basis. Information on the performance of systems in both GTA and other jurisdictions was used to assess the reliability of components and systems. Systems or components which have had a good track record for consistent operation and achievement of the design objectives were considered highly reliable. Systems or components which have had a track record of breakdowns, plant shutdowns, inconsistent enforcement and compliance were considered to have low reliability.

The Service Appendix presents technical data on which the performance, reliability, flexibility and of various system components and systems were evaluated. The social acceptability data are presented in the Social Environment Technical Appendix (Hardy Stevenson and Associates, 1994). Summary information on the socal acceptability of each system is presented in Chapter 13 of this Appendix.

The Service Appendix text focusses on waste quantity estimates, the methodology used to develop diversion estimates for each system, and the diversion estimates developed as part of the study. Schedules to the Service Technical Appendix present data on which the reliability and flexibility of the system components and systems were evaluated.

2.3 Data Sources and Method of Analysis

All systems analysis was based on the best available information. To gather information related to each criteria group for the residential systems, the study team contacted representatives of each municipality in the GTA to gather information related to performance of existing waste diversion systems and the committed systems. Leading edge waste diversion programs from across North America (and Europe) were either contacted or studied using available published and unpublished reports in order to gain information related to each of the criteria and indicators used for the Service Discipline analysis.

Table 2.1

GTA 3Rs System Assessment
Alternative System Assessment/Evaluation Criteria
For Service Discipline

Goal/Criteria Group/Criteria	Indicator	Definition	Rationale
Reliability	• proven technology(ies) based on experience in other jurisdictions	This criterion addressed the reliability of the system in terms of providing a continuous service and achieving the service goal of providing reliable diversion Reliance on a single approach is considered vulnerable to poor performance, if the single approach fails (through breakdown, etc.)	To ensure an ongoing level of service, the selected systems must have a proven level of reliability in order to divert waste on a consistent, continuous basis. A system is more reliable if it involves a number of approaches then breakdown of one component does not cause system failure. Addresses the goal of maximizing service.
Flexibility	• types and range of quantities accepted • compatibility with Existing system	This criterion addressed the ability of the system to accommodate variable waste quantities and characteristics	A preferable system would be one which can adapt to changing waste quantities and compositions and can be integrated with existing facilities Addresses the goal of maximizing service
Performance	• quantity diverted or requiring landfilling	This criterion addressed the reduction in quantity of waste requiring disposal	This criterion addressed the goal of maximizing service by maximizing the quantity of waste diverted from landfilling.
Social Acceptability	• participation in 3Rs (current and future) by: - individuals - municipalities - IC&I sector - special/sensitive groups • attitudes and perceptions toward 3Rs activities • willingness to pay	This factor addressed the likelihood of success of an alternative based on current reasons for patterns of participation and on changing attitudes and perceptions toward 3Rs activities over the time horizon of the study. Social acceptance was considered on a Regional and GTA level.	The public, municipalities and the IC&I sector must accept the 3Rs system for it to become fully operational. Preferable systems are those that have a high potential for being socially acceptable. The criterion provided input to the level of service provided by the systems based on potential behaviour or social response. Addressed the goal of maximizing service in terms of waste diversion.

For the IC&I systems, information about waste disposal and diversion was obtained through several sources, as described in Chapter 12 and Schedule O of this Appendix. These sources included private sector haulers and recyclers, municipal representatives, IC&I sector organizations and businesses in the GTA, who were surveyed by telephone at the beginning of the project, and were re-contacted to confirm data or obtain comments on the draft study reports on a number of occasions throughout the study. Representatives of North American jurisdictions which have adoptd innovative approaches to IC&I waste diversion were also contacted by telephone. A literature search and review was carried out to identify additional information on IC&I waste diversion in the GTA or approaches to IC&I waste diversion used in other jurisdictions. Recent studies on waste disposal, diversion and composition of IC&I waste and waste management practices were identified and reviewed. Employment data and employment projections for each GTA region were obtained from Statistics Canada and other GTA reports on a sector by sector basis, and were used along with the information from the IC&I waste composition reports to estimate future waste generation and composition by the IC&I sector.

Input from Consultation Activities

As part of the GTA 3Rs Analysis, a public and agency consultation program was conducted. As discussed in detail within the GTA 3Rs Analysis EA Input document, key consultation activities which were undertaken included: documentation, distribution, attendance at IWA information Centres, meetings with municipal representatives, review of participant's reports and telephone contacts with stakeholders. Comments were received from regional or local municipalities clarifying the components of their existing systems and including revisions to their committed systems. For example, the Composting Council of Canada sugested an additional residential and IC&I system (with the proposed name "Expanded Centralized Composting") which should be evaluated. The diversion and cost estimates of this system may be evaluated at a later date.

Based on these and other activities, data upgrades and revisions to the documentation were made. Appendix A of the EA Input Document summarizes comments received and responses to them.

2.4 Assumptions

2.4.1 <u>General Assumptions</u>

General assumptions used in the analysis include the following:

- The study period extends from 1996 to 2015;
- Markets will be available for the recycled materials and compost from source separated compostables;
- Residential waste diversion systems are developed and analyzed separately for each GTA Region. However, because there is no effective waste management boundary for IC&I waste and recyclables (IC&I waste management is not confined by municipal boundaries), IC&I waste diversion systems are developed for the GTA as a whole;
- Regulations identified in the IC&I systems are assumed to be enforced equally throughout the province and for all systems;

- 3Rs components would be developed in a manner that fulfils the necessary MOEE approvals (e.g. Certificate of Approval);
- The 3Rs systems developed are considered reasonable, they represent a range of plausible diversion approaches and do not necessarily represent the highest possible diversion at all times;
- The mixing and matching of 3Rs components beyond what is done in this report is possible but not assessed due to the large number of possible permutations and combinations;
- The net effects analysis is based on the year 2000, the year in which all systems are assumed to be fully operational;
- The analysis is generic; specific sites/locations for new facilities for each of the systems were neither known nor considered;
- The potential effects of landfill were not considered in the systems net effects;
- The effects of a facility are attributed to the region which uses it;
- All systems were analyzed to the same level of detail;
- It is assumed that larger facilities will be sited to minimize effects (i.e. located in areas most compatible with the facility) through a systematic site selection process;
- The mitigation measures identified are readily available and would be implemented effectively;
- The diversion rate estimates were generated for the year 2000 (the year by which the systems were assumed to be fully operational) and for the 20 year cumulative study period. Increases in diversion rates after the year 2000 are attributed to source reduction;
- A combined diversion rate estimate was determined for Metro Toronto and the Region of York. Alternative systems, however, were evaluated separately for these two Regions;
- Only effects directly attributable to the 3Rs systems development and operation were considered;
- For all of the residential 3Rs systems, it is assumed that the system would be designed and managed such that there would not be any increase in the total number of collection vehicle trips in any residential area, or any increase in the net amount of time required to pick up materials;
- The export of waste, for the purposes of this study, was considered disposal.

2.4.2 Service Discipline Assumptions

The definition of waste used in this analysis is taken from Regulation 347 (RSO 1990, printed June 1993) and is as follows:

"municipal waste" means,

a. any waste whether or not it is owned, controlled or managed by a municipality, except,

   i. hazardous waste,
   ii. liquid industrial waste, or
   iii. gaseous waste, and

b. solid fuel, whether or not it is waste, that is derived in whole or in part from the waste included in clause (a); O. Reg. 555/92, s. 1.

The detailed assumptions used in the analysis of the Residential Systems are presented in Chapter 5. Chapters 11 and 12 present detailed assumptions used in analysis of the IC&I Systems.

3.0 WASTE DIVERSION SYSTEM DEVELOPMENT

3.1 Introduction

This chapter describes the method used to develop alternative 3Rs systems for the residential and IC&I sectors.

3.2 Waste Diversion System Development Process

A range of 6 residential and 6 IC&I waste diversion systems were developed in the GTA 3Rs Analysis. A methodical process of system development was undertaken. The objective was to combine a wide range of alternative waste diversion components into logical systems which could potentially be used for waste diversion, throughout the GTA. The method used for system development is illustrated in Figure 3.1.

The systems were developed to provide a basis for comparing alternative waste diversion approaches. **No attempt was made to analyse all possible systems, nor was this an attempt to provide conclusive recommendations of preferred systems for waste diversion in GTA Regions. The range of alternative systems developed were considered to be reasonable for the GTA. It will also be the municipalities themselves who decide which system is most appropriate considering their own local issues/conditions.**

The system development process consisted of 4 tasks:

1. Defining Key Assumptions
2. Identifying Long List of Components
3. Component Screening
4. System Development.

Tasks involved in the process are described in the following sections.

3.3 Task 1: Defining Key Assumptions

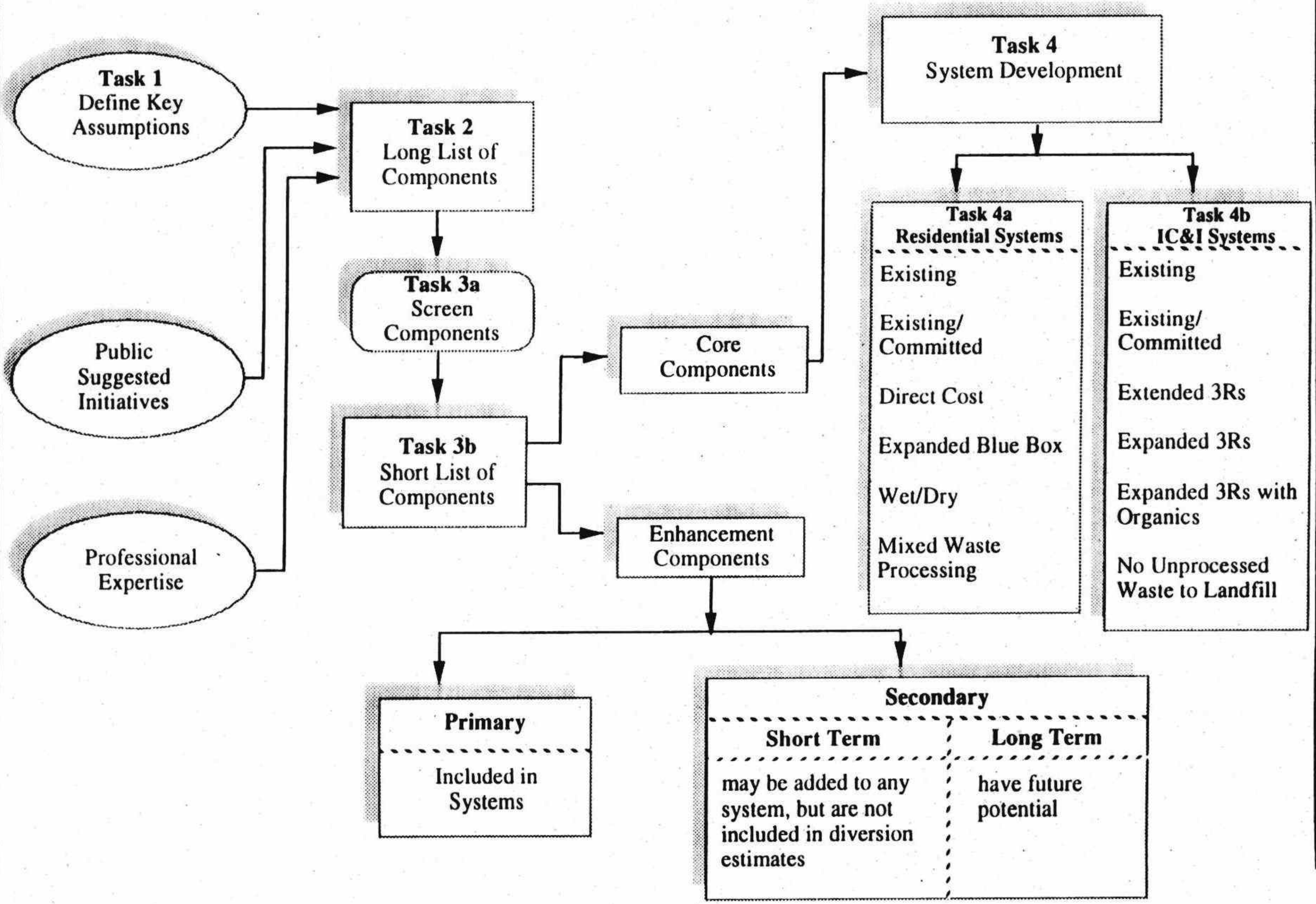
Several assumptions were necessary in order to suggest alternative waste diversion systems that might be applicable to the GTA. The assumptions used are as follows:

- The Existing System would be included in the analysis. It would be defined as the 3Rs system in place within each regional municipality as of December 31, 1992;

- Commitments made through five year Regional and Municipal budgets, which were considered likely to occur through discussions with Regional staff, and Federal and Provincial policies announced by 31 December 1992 were termed the Existing/Committed System. While each of the four Regional Municipalities would be affected by the same Federal and Provincial commitments, they differed with respect to Regional, municipal and private sector commitments;

- A "long list" of waste diversion components would be developed (as explained in Section 3.5.1). This would be a list of any components that *could* theoretically be applied in any or each of the GTA Regional Municipalities for waste diversion.

Figure 3.1
GTA Waste Diversion System Development



3.4 Task 2: Identifying the Long List of Components

The long list of components considered in this study was developed by combining information from the following sources:

- Components of Existing and Existing/Committed Systems;
- Comments from the public;
- Review of literature and current or proposed practice world wide to identify technologies, policies and techniques that may be incorporated in waste diversion systems.

3.5 Task 3: Component Screening and Categorization

3.5.1 Task 3A: Component Screening

The "long list" of Residential and IC&I components was screened using three criteria. For a component to be retained for further consideration in system development, each criterion had to be satisfied. The criteria are described below:

Criterion 1: A component must represent a proven technology, technique, policy and/or program
This criterion is defined to represent technologies, techniques, policies and/or programs which have the intention of diverting waste and have been successfully implemented in at least one other jurisdiction (world wide). If a component is not successfully implemented at full scale at this time but was considered to have potential for successful implementation in the future, the component was retained as a "secondary enhancement long term component" (described below).

Criterion 2: A component must satisfy Government policy, regulations and standards
This criterion addresses whether a given technology, technique, policy or program is consistent with stated government policy and also meets current regulations and standards. Components requiring new legislation or amendments to existing legislation were not necessarily screened out on this basis, provided that they did not contradict existing policy.

Criterion 3: A component must reduce the quantity of waste requiring final disposal
Under this criterion, a technology, technique, policy or program must demonstrate an ability to divert a reasonable amount (which was defined generally as at least 1% for the purpose of this study) of waste from disposal. If a component was known to be beneficial (e.g. promotion/education) but measured data on diversion impacts were not available, the component was retained for inclusion in systems.

Components which met the three screening criteria discussed above formed a "short list" of components, which was used for Residential and IC&I system development.

3.5.2 Task 3B: Categorization of "Short List" Components

Waste diversion is an evolving field with new technologies and policies continually emerging. To provide the flexibility needed to fairly evaluate "new" components, a multi-level component categorization system was used. It helped ensure that components which had future potential, but for which adequate data were not currently available, were not eliminated from consideration.

Waste diversion systems contain many elements which can be combined in different ways to form systems. In order to limit the number of systems that could be considered to a

manageable number, the study team developed a category of components considered essential for system development, and a second category of optional components. The optional components are those which can be considered as a menu of options to add to any of the systems considered.

By categorizing components, the study team was able to specify the role that each component would play in development of alternative waste diversion systems for the GTA.

Components which had satisfied the screening criteria discussed above were classified as either Core components or Enhancement Components. The purpose of each category is as follows:

Core Components
Core Components consist of a technique, technology or policy that could serve as the focus of a distinguishable alternative waste diversion system. Most core components consist of a type of technology (including collecting and processing elements) around which a system can be developed. As an example, collection of dry recyclables, and processing of dry recyclables in a MRF would be core components of an Expanded Blue Box program. If a specific policy was considered likely to contribute substantially to a waste diversion system, it could also be retained as a core component. Therefore, some systems include regulatory measures or economic instruments as core components.

Enhancement Components
Enhancement components *could be* added to systems to enhance system performance and increase waste diversion. Enhancement components were further divided into primary and secondary enhancement component categories. **Only core and primary enhancement components were included in alternative waste diversion systems developed for analysis in the GTA.** A description of each enhancement component category is as follows:

— **Primary Enhancement Components**
Primary Enhancement Components were used along with core components to build alternative waste diversion systems. These components (e.g. promotion and education) are proven to add an important element that would contribute to the function of a waste diversion system. The key distinction between primary and core components is that while core components can form the basis of a system, no system would be built around a primary enhancement component. In many cases, components that presently exist in GTA systems were included as primary enhancement components.

— **Secondary Enhancement Components**
Secondary Enhancement Components were components that were considered to have potential for inclusion in the different systems developed. They could be added to systems to increase waste diversion but were not considered critical to their function. Because of this, no secondary enhancement components are included in the alternative waste diversion systems developed for this study.

The Secondary Enhancement category was further divided into:

— **Immediate Secondary Enhancement Components**
These were components with immediate potential (e.g. landfill bans on leaf and yard waste, storage of recyclables, deposit systems, product stewardship) which could be added in the immediate future to enhance the performance of any of the systems considered.

— **Long Term Secondary Enhancements**
These were components that indicated potential for waste diversion (e.g. funding incentives to product manufacturers) but may not have been fully proven at this time. These were classified as long term secondary enhancement components and were retained for future consideration.

Table 3.1 summarizes the defining features of each component category.

Table 3.1

Summary of Component Categorization Process

Component Category	Role	Defining Feature	Comments
Core Component	Included in alternative systems	• Provides basis for waste diversion system development	• Provides one of defining characteristics of alternative waste management systems
Primary Enhancement Component		• Used with core components to develop complete waste diversion system	• Component lacks ability to form basis of an alternative system on its own • Category includes components that offer less than 1% diversion but are still considered beneficial may be retained up to this level
Secondary Immediate Enhancement Component	Not included in alternative systems	• Components indicate immediate potential but are not crucial to function of any one system	• Components not included in any waste diversion systems developed for GTA 3Rs Analysis, but could be added to systems to enhance performance
Secondary Long-Term Enhancement Component		• Components are not proven at this time but may have potential over the long term	• Components not included in any waste diversion systems developed for GTA 3Rs Analysis
Screened Out		• Components are not currently proven • Components contradict MOEE policy • Components contribute less than 1% to waste diversion	• Components are removed from long list and receive no further analysis

The screening process described above resulted in a list of 19 core and 55 primary enhancement components which were used to develop waste diversion systems for the GTA 3Rs Analysis.

3.5.3 Results of Component Screening

Table 3.2 at the end of this chapter presents the "long list" of components evaluated in this study and the results of the component screening process. For ease of presentation, components are presented in Table 3.2 under the following headings:

RESIDENTIAL COMPONENTS	IC&I COMPONENTS
• Reduction and Reuse (Residential and IC&I) • Residential Recycling and Collection • Residential Leaf and Yard Waste Collection • Residential Household Composting • Other Residential Waste Diversion • Composting/Anaerobic Digestion Facilities • Reuse Centres • Processing of Dry Materials • Residential Recycling Depots/ Transfer Stations • Residential Regulation • Residential Programs • Residential Promotion /Education • Residential Economic Incentives • Residential Market Development Policies	• IC&I Hauling Recycling and Storage • IC&I Composting • IC&I Reuse • IC&I Recycling Depots/Transfer Stations • MRFs/Processing for IC&I Sector • IC&I Regulation • IC&I Programs • IC&I Promotion/Education • IC&I Economic Incentives • IC&I Market Development Policies

Table 3.3 at the end of this chapter presents an estimate of the waste diversion potential that *could be* achieved by each of the secondary enhancement components, based on available data culled from a variety of studies. For some of the secondary enhancement components, reliable data on their diversion potential are not available at this time, due to lack of study, etc. Where this is the case it has been noted. Table 3.3 provides an indication of additional diversion that *might be achieved* should these components be added to any of the alternative waste diversion systems studied in the GTA 3Rs Analysis.

Schedule A provides documentation and rationale for the diversion estimates presented in Table 3.3.

3.6 Task 4: System Development

3.6.1 Task 4a: Developing Potential Alternative Residential Waste Diversion Systems for GTA

A set of six representative residential waste diversion systems was developed from the short list of core and primary enhancement components. The systems presented in this study do not span the full range of potential waste diversion systems that could be considered, and

development of these particular systems does not imply a preference on the part of the authors. The systems provided a basis from which to examine the potential for different approaches to waste diversion in GTA municipalities, but do not present a complete list of possible permutations and combinations of waste diversion system components to optimize diversion.

The Existing System was in place at the end of 1992. Any commitments made for waste diversion, at all levels of government, were incorporated into the Existing/Committed System for each region. Four additional residential waste diversion systems, which present an array of distinctly different technological and/or policy-driven approaches to residential waste diversion were also developed. Components which were identified as "core" in Table 3.2 were combined with those identified as "primary enhancement components" to form these four additional residential waste diversion systems, which were:

- a "Direct Cost" system;
- an "Expanded Blue Box" system;
- a "Wet/Dry" system; and
- a "Mixed Waste Processing" system.

A brief description of the six residential waste diversion systems is presented below:

Residential System 1 - Existing - this system is based on the status quo, i.e. the residential waste diversion system which was in place in each GTA Regional municipality on 31 December, 1992;

Residential System 2 - Existing/Committed - policies announced by 31 December, 1992 (including 3Rs Regulations) and waste diversion programs committed in most recent Regional five-year budgets (to the end of 1997 or 1998) that were considered likely to proceed by regional staff and the study team;

Residential System 3 - Direct Cost - an alternative built on the Existing/Committed System which includes a direct charge to the home-owner for garbage collection and provides an economic incentive to increase waste diversion;

Residential System 4 - Expanded Blue Box - a system where the range of dry recyclables collected at the curb is expanded and household organics (food and yard waste) are managed through backyard composters and separate collections of leaf and yard waste;

Residential System 5 - Wet/Dry - household waste is collected in three streams including wet food and yard wastes, dry recyclables, and garbage, with central composting of wet wastes;

Residential System 6 - Mixed Waste Processing - a system which builds on the Existing/Committed System and includes Blue Box collection of recyclables, separate collection of leaf and yard waste, backyard composting of some household wet wastes and processing of the remaining "third bag" of waste in a mixed waste processing and composting plant.

More detailed descriptions of each system are presented in Chapter 5 of this Appendix.

Table 3.4 summarizes components retained for inclusion in systems development, and lists the systems into which these components were incorporated.

3.6.2 Task 4B: Developing Potential Alternative IC&I Waste Diversion Systems for the GTA

A set of six representative IC&I waste diversion systems was developed from the short list of core and primary enhancement components. As with the residential systems, a group of potential alternative systems was assembled as a *combination of waste diversion components* which could be added to the Existing or Existing/Committed IC&I waste diversion systems to reduce the amount of waste which requires disposal. The systems provided a basis from which to examine the potential for different approaches to divert IC&I waste in GTA municipalities, but do not represent a complete list of possible combinations of waste diversion system components to optimize diversion.

The Existing System was based on the system in place in the GTA at the end of 1992. Any policy and program commitments made for waste diversion, at all levels of government, were incorporated into the Existing/Committed System. This includes the impacts of the Provincial 3Rs Regulations and NAPP.

In addition to these two systems, four additional alternative systems were developed. Because waste management in the IC&I sector is predominantly conducted on a private basis, a regulatory approach, which can cover all IC&I generators is a comprehensive method by which diversion can be increased. For this reason, the IC&I systems focus on regulatory measures which could be implemented to increase the quantities of IC&I waste diverted.

Again, components which were identified as "core" in Table 3.2 were combined with those identified as "primary enhancement components". Together, these combined to form four alternative IC&I waste diversion systems, which were:

- an "Extended 3Rs" Regulations system;
- an "Expanded 3Rs" Regulations system;
- an "Expanded 3Rs Regulations with Organics" system; and
- a "No Unprocessed Waste to Landfill" system.

A brief description of the six IC&I waste diversion systems is presented below:

IC&I System 1 - Existing - this system is based on the IC&I waste diversion system that was in place in the GTA as of 31 December, 1992.

IC&I System 2 - Existing/Committed - policies announced as of 31 December, 1992. These include the 3Rs Regulations which require that designated sectors conduct waste audits, packaging audits, develop waste and packaging reduction plans and implement source separation programs for specified materials. Impacts of the National Packaging Protocol (NAPP) are also included in this system.

IC&I System 3 - Extended 3Rs Regulations - a system built on System 2 that applies 3Rs Regulations to a much greater number of IC&I generators.

IC&I System 4 - Expanded 3Rs Regulations - a system that builds on System 3, and mandates source separation of a wider range of dry materials by the same group and number of IC&I generators identified in System 3.

IC&I System 5 - Expanded 3Rs Regulations with Organics - a system that builds on System 4, and requires designated IC&I generators to source separate and divert wet wastes (food waste, leaf and yard wastes).

IC&I System 6 - No Unprocessed Waste to Landfill - a system that builds on System 2 and would require that all material disposed as waste be processed prior to landfilling.

A more detailed description of these systems is presented in Chapter 12 of this Appendix.

Table 3.2
Long List of Waste Diversion Components and Component Screening

Component #	Components	Existing or Committed in GTA Regions				Screening Criteria			Screening Conclusion					
		Durham	Peel	Metro	York	Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Core	Enhancement			Screened Out	Rationale
										Primary	Secondary			
											Immediate	Long Term		
RESIDENTIAL														
1.0 Reduction and Reuse (Residential and IC&I)														
1.1	Funding/distribution of source reduction equipment (backyard composters, cloth shopping bags etc.)	exists to some extent in GTA Regions				proven	N/A	reduces quantity of waste disposed		√				Retain on basis that component reduces waste and technology is proven
1.2	Create waste reduction offices in each Region with the primary objective of promoting reduction and reuse	exists to some extent in GTA Regions				likely effective, not proven in quantitative way	N/A	likely contributes to reduction in quantity of waste disposed over time		√				Retain on basis that offices currently exist and contribute to waste reduction
1.3	Establish community-based (i.e. municipal, non-profit, charitable, etc.) reuse/ repair and goods exchange centres	exists to some extent in GTA Regions				proven to divert waste from disposal	N/A	reduces quantity of waste disposed		√				Retain on basis that component is proven and can reduce quantity of waste disposed
1.4	Support the efforts of charitable organizations and food reuse organizations	exists to some extent in GTA Regions				proven to divert waste from disposal	N/A	reduces quantity of waste disposed		√				Retain on basis that charitable organizations contribute to reuse
1.5	Promotion of grass-cycling and xeriscaping	exists to some extent in GTA Regions				proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component contributes to reduction of grass in waste stream
1.6	Landfill ban on leaf and yard wastes, to force increased management on residential property	not in GTA at present				proven	N/A	reduces quantity of waste disposed			√			Retain on basis that the component is considered a valuable enhancement to any diversion system since the component contributes to diversion of leaf and yard waste
1.7	Eliminate pick-up for leaf and yard waste (Oakville has implemented ban on grass pick-up)	exists in Halton at present				proven	N/A	reduces quantity of waste disposed			√			Retain on basis that component encourages homeowners to manage grass waste on site and contributes to diversion
1.8	Increase use of refillable/reusable packaging and products	carried out on voluntary basis in GTA				proven	may require government regulations	reduces quantity of waste disposed			√			Retain on basis that the component decreases use of disposable packaging and products, and therefore contributes to waste reduction through reuse
1.9	Landfill bans on recyclable material	exists to some extent in GTA				proven	N/A	decreases quantity disposed in GTA landfills			√			Retain on basis that the component encourages increased recycling and therefore contributes to waste diversion
1.10	Waste reduction planning requirements for construction/demolition projects	exists to some extent in GTA				likely to reduce quantities	required under MOEE 3Rs regulations	likely to increase use of secondary materials and reduce disposed waste over time			√			Retain on basis that the component encourages consideration of waste diversion in construction planning which will lead to waste diversion

Component #	Components	Existing or Committed in GTA Regions				Screening Criteria			Screening Conclusion					
		Durham	Peel	Metro	York	Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Core	Enhancement			Screened Out	Rationale
										Primary	Secondary			
											Immediate	Long Term		
RESIDENTIAL														
1.0 Reduction and Reuse (Residential and IC&I)														
1.11	Procurement ordinances (favouring durable products, recycled content, and/or reusable purchases)	exists to some extent in GTA				likely to reduce quantities	N/A	likely to increase use of secondary materials and reduce disposed waste over time			√			Retain on basis that the component promotes use of reusable and durable goods which reduces generation of waste, and assists in market development for secondary materials, which will increase demand and promote recycing over long term
1.12	Local product or packaging bans	not in effect in GTA at this time				in place in state of Maine (aseptics); effects on generation of other wastes unknown (may increase waste generation)	N/A	may increase quantities disposed by causing shift to other more wasteful packaging					√	Screen on basis of uncertain and unproven waste diversion impacts
1.13	Promotion/education for school children focusing on waste reduction	in place in many/most GTA schools				proven	N/A	likely to have waste reduction impact over longer term		√				Retain on basis that this increases participation in existing waste diversion programs and will result in long term benefits (of consumer education)
1.14	Economic incentives such as Direct Cost for garbage disposal (see later section on economic incentives)	not in GTA for residential waste at this time				proven	Bill 7 provides necessary powers	reduces quantity of waste disposed	√					Retain as core component on basis that this provides strong economic incentives for waste diversion which has proven to increase waste diversion in many jurisdictions
1.15	Promotion/education program for consumers focusing on purchasing habit changes to minimize waste generation (for example bulk buying, borrowing items, buying products in recyclable packaging etc)	in GTA at this time				effect not measured, but likely to cause behaviour change over time	N/A	likely to reduce quantity of waste disposed over time		√				Retain on basis that the component promotes a change in consumption habits which results in decreased waste generation
1.16	Product redesign for increased product life and durability	uncertain of degree to which this occurs in GTA - products sold in GTA manufactured world-wide				increased durability would decrease discard rate	N/A	likely to reduce quantity of waste disposed over time			√			Retain on basis that the component results in decreased waste generation (due to longer product life)
1.17	Packaging redesign to reduce quantity and weight (light weighting)	parts and packaging sold in GTA manufactured world-wide, some packaging redesign underway by Canadian companies to comply with NAPP				will reduce packaging waste (which is 30% of residential wastes)	NAPP, a voluntary federal initiative; already targets packaging waste	reduces quantity of waste to disposal			√			Retain on basis that the component results in decreased waste generation (due to reduced packaging waste)
1.18	Promote reuse (refillable packages, reuse centres)	in GTA at this time				re-use activities reduce waste going to disposal - uncertain of the extent to which promotion impacts reuse	N/A	likely to reduce quantity to disposal by encouraging reuse		√				Retain on basis that increased reuse leads to decreased use of disposable packages and products, thereby reducing the waste stream

Component #	Components	Existing or Committed in GTA Regions: Durham	Peel	Metro	York	Screening Criteria: Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Screening Conclusion: Core	Enhancement: Primary	Secondary: Immediate	Secondary: Long Term	Screened Out	Rationale
RESIDENTIAL														
1.0 Reduction and Reuse (Residential and IC&I)														
1.19	Deposit/refund systems for a variety of materials	in place for some materials (beer bottles)				proven	N/A	reduces quantity of waste disposed			√			Retain on basis that deposit/refund systems contribute to increased recovery of materials. Provincial legislation required for implementation
1.20	Hold community source reduction workshops	not in place in GTA				proven at pilot scale (e.g. Maxville Kenyon)	N/A	likely to reduce quantity of waste disposed (amount not easily quantified)		√				Retain on basis that the component encourages source reduction behaviour
1.21	Develop "pre-cycling" campaign	not in place as major programs				impacts not proven quantitatively, likely to cause change in behaviour over time	N/A	likely to reduce quantity of waste disposed over time		√				Retain on basis that educating consumers results in improved source reduction behaviour and decreased waste generation
1.22	Develop award system to recognize waste reduction achievements	in place in GTA				proven (e.g. RCO awards)	N/A	likely to reduce quantity of waste disposed indirectly		√				Retain on basis that the component currently exists and contributes to waste reduction
1.23	Organize SWAP days or neighbourhood garage sales	exists to limited extent in GTA				proven	N/A	minor impact on quantity of waste disposed		√				Retain on basis that the component currently exists and results in decreased waste generation
1.24	Develop infrastructure for distribution of high quality food from catering facilities (e.g. Second Harvest)	in place through efforts of Second Harvest				proven	may be some limitations due to liability and public health concerns	reduces quantity of waste disposed			√			Retain on basis that the component currently exists and provides best end use of food waste, and diverts waste from disposal
1.25	Use food waste as animal feed	in place and used by GTA generators				proven	Ministry of Agriculture limitations on approach for some livestock	reduces quantity of waste disposed		√				Retain on basis that the component currently exists and successfully reduces the amount of food waste disposed and results in valuable secondary use of the food
1.26	Landspread food waste	in place and used by GTA generators				proven	reviewed on a case by case basis by MOEE	reduces quantity of waste disposed		√				Retain on basis that the component currently exists and food waste is diverted to a useful purpose
1.27	Restrict advertising to airwaves (to minimize paper production)	not in place in GTA				unproven	unlikely that this can be implemented	if implemented, would reduce paper waste significantly					√	Although this may result in waste diversion, the component has not been proven and may constitute unfair business practices. Screen on basis of unproven technique
1.28	Provide neighbourhood leaf shredders in fall	not in GTA				assume proven	N/A	would reduce quantity of disposal if leaves put to alternative uses			√			Retain on basis that the component may encourage increased diversion of leaf waste

Component #	Components	Existing or Committed in GTA Regions				Screening Criteria			Screening Conclusion					
		Durham	Peel	Metro	York	Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Core	Enhancement			Screened Out	Rationale
										Primary	Secondary			
											Immediate	Long Term		
RESIDENTIAL														
2.0 Residential Recycling and Collection														
2.1	Curbside collection of Blue Box materials	Y	Y	Y	Y	proven	required in MOEE 3Rs regulations	reduces quantity of waste disposed	√					Retain on basis that the component currently exists in GTA (and elsewhere) and has contributed to waste diversion
2.2	Curbside collection of Expanded Blue Box materials (ONP, OCC, boxboard, PET, HDPE, film and other plastics, glass, aluminum, tinplate steel, mixed paper, fine paper, textiles)	N	Y	N	N	proven	N/A	reduces quantity of waste disposed	√					Retain on basis that the component currently exists in GTA and has contributed to waste diversion
2.3	Collection of all dry waste in a 2-stream wet-dry system	N	N	N	N	proven	conflicts with government policy	reduces quantity of waste disposed					√	While the component may contribute to waste diversion, this component conflicts with government policy
2.4	Collection of all dry recyclables and waste in a 3-stream wet-dry system	N	N	N	N	proven	N/A	reduces quantity of waste disposed	√					Retain on basis that the component has proven successful in diverting waste
2.5	Collection of all dry recyclables in a 4-stream wet-dry system	N	N	N	N	proven	N/A	reduces quantity of waste disposed			√			Retain as immediate secondary enhancement, potential variation of 3-stream system design, contributes to waste diversion
2.6	Collection of recyclables at all multi-family dwellings	N	N	N	N	proven	N/A	reduces quantity of waste disposed			√			Retain as valuable element in providing comprehensive waste diversion services to householders in GTA
2.7	Recycling services to all rural households in GTA (depot, curbside)	N	N	N	N	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component would increase diversion
2.8	Drop-off depot system for dry recyclables and other (e.g. bulky) materials	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component would provide increased opportunities for diversion
2.9	Collection of dry recyclables in a mixed waste collection system	N	N	N	N	limited success	conflicts with MOEE 3Rs regulations	reduces quantity of waste disposed					√	Screen on basis that component conflicts with government policy for source separation
2.10	Curbside collection of wet household kitchen waste	N	N	N	N	proven at pilot scale	N/A	reduces quantity of waste disposed		√				Retain on basis that the component contributes to diversion of wet wastes not handled by existing recycling systems
2.11	Curbside collection of household organics in a 2-stream wet/dry collection system	N	N	N	N	proven at pilot scale	conflicts with government policy	reduces quantity of waste disposed					√	Screen on basis that a 2-stream collection system conflicts with government policy
2.12	Curbside collection of household organics in a 3- stream wet/dry collection system	N	N	N	N	proven at pilot scale	N/A	reduces quantity of waste disposed	√					Retain on basis that the component contributes to increased waste diversion
2.13	Curbside collection of household organics in a 4-stream wet/dry collection system	N	N	N	N	proven at pilot scale	N/A	reduces quantity of waste disposed			√			Retain as immediate secondary enhancement, variation of 3-stream system design

Component #	Components	Existing or Committed in GTA Regions				Screening Criteria			Screening Conclusion					
		Durham	Peel	Metro	York	Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Core	Enhancement			Screened Out	Rationale
										Primary	Secondary			
											Immediate	Long Term		
RESIDENTIAL														
2.0 Residential Recycling and Collection														
2.14	Special/separate collections at curbside	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides opportunities to divert waste conveniently
2.15	Collection of dry recyclables from multi-family buildings containing 6 or more units	Y	Y	Y	Y	proven	required by 3Rs Regulations	reduces quantity of waste disposed		√				Retain on basis that the component contributes to increased waste diversion
2.16	Collection of 3rd bag of waste (garbage remaining after source separation of dry recyclables and leaf and yard waste) for further processing	N	N	N	N	proven	N/A	reduces quantity of waste disposed	√					Retain on basis that the component contributes to increased capture and diversion of recyclable materials, and composting of remaining mixed waste stream resulting in decreased waste disposal
3.0 Residential Leaf and Yard Waste Collection														
3.1	Seasonal curbside collection of leaf and yard waste	Y	Y	Y	Y	proven	meets requirements of 3Rs Regulations	reduces quantity of waste disposed		√				Retain on basis that the component provides opportunities to divert leaf and yard waste conveniently, and composting of remaining mixed waste stream
3.2	Drop-off depots for leaf and yard wastes	Y	Y	Y	Y	proven	meets requirements of 3Rs Regulations	reduces quantity of waste disposed		√				Retain on basis that the component provides opportunities to divert leaf and yard waste and reduces waste disposed
4.0 Residential Household Composting														
4.1	Distribution/provision of backyard composters for backyard composting by single family residents	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides opportunities to divert residential organics resulting in increased waste diversion
4.2	Backyard composting (large 3-bin units) for multi-family residents	N	N	Y	N	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides opportunity to divert residential organics from multi-family units resulting in increased waste diversion
4.3	Vermicomposting by multi-family residents	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides opportunity to divert residential organics from multi-family units resulting in increased waste diversion

Component #	Components	Existing or Committed in GTA Regions: Durham	Peel	Metro	York	Screening Criteria: Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Screening Conclusion: Core	Enhancement: Primary	Enhancement: Secondary Immediate	Enhancement: Secondary Long Term	Screened Out	Rationale
RESIDENTIAL														
5.0 Other Residential Waste Diversion														
5.1	Household hazardous waste (including mobile HHW depots)	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides an opportunity to divert an additional element of the waste stream resulting in increased waste diversion
5.2	Toxic taxi	N	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides a convenient opportunity to divert an additional element of the waste stream resulting in increased waste diversion
5.3	White goods collection and drop-off	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides an opportunity to divert additional elements of the waste stream resulting in increased waste diversion
5.4	Special/separate collections at curbside for bulky waste (white goods, furniture, Christmas trees, etc)	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides a convenient opportunity to divert additional elements of the waste stream resulting in increased waste diversion
6.0 Composting/Anaerobic Digestion Facilities														
6.1	Centralized windrow composting of source separated household organics (food, leaf and yard, etc.)	N	N	N	N	proven	N/A	reduces quantity of waste disposed			√			Retain as secondary immediate component on basis that the component results in increased waste diversion but may experience odour problems
6.2	Centralized windrow composting of third bag mixed waste remaining after source separation of Blue Box materials and leaf and yard waste	N	N	N	N	proven	compost quality may not meet MOEE requirements for unrestricted use. Restricted use may or may not be feasible	reduces quantity of waste disposed			√			Retain as secondary immediate component on basis that the component results in increased waste diversion but may experience odour problems
6.3	Centralized windrow composting of mixed waste	N	N	N	N	proven	conflicts with MOEE 3Rs regulations on source separation	reduces quantity of waste disposed					√	Screen on basis that component conflicts with MOEE 3Rs Regulations
6.4	Centralized in-vessel composting of source separated organics	N	N	Y	N	proven	N/A	reduces quantity of waste disposed	√					Retain on basis that the component is an appropriate processing technology for household organics collected in a 3-stream collection system
6.5	Centralized in-vessel composting of mixed waste (third bag)	N	N	N	N	proven	N/A	reduces quantity of waste disposed	√					Retain on basis that the component is a required processing technology for third bag, to increase diversion

Com-ponent #	Components	Existing or Committed in GTA Regions				Screening Criteria			Screening Conclusion					
		Durham	Peel	Metro	York	Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Core	Enhancement			Screened Out	Rationale
										Primary	Secondary			
											Immediate	Long Term		
RESIDENTIAL														
6.0 Composting/Anaerobic Digestion Facilities														
6.6	Centralized in-vessel composting of mixed waste	N	N	N	N	proven	conflicts with MOEE 3Rs regulations on source separation	reduces quantity of waste disposed					√	Although this technology may result in waste diversion, screen on basis of conflict with MOEE 3Rs Regulations
6.7	Community composting/gardening projects	in GTA				proven	compost can be used locally	reduces quantity of waste disposed		√				Retain on basis that the component contributes to increased awareness of composting and results in waste diversion
6.8	Centralized windrow composting of leaf and yard waste	in GTA				proven	compost can be used locally	reduces quantity of waste disposed	√					Retain as core component on basis that the component processes diverted leaf and yard waste
6.9	Use centralized anaerobic digesters	N	N	N	N	proven in Europe	N/A	reduces quantity of waste disposed			√			Retain as secondary immediate component as potential substitute for aerobic composting
7.0 Reuse Centres														
7.1	Social Service Centres (i.e. Goodwill)	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on the basis that components exist and contribute to waste reduction through reuse
8.0 Processing of Dry Materials														
8.1	Processing of source separated or commingled dry recyclables in material recovery facility (MRF) (improved or expanded as required)	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed	√					Retain as a core component as the component is proven technology for processing of dry recyclables
8.2	Processing of mixed (non source-separated) wet and dry waste in a Mixed Waste Processing and Composting Facility	N	N	N	N	proven	conflicts with 3Rs regulations which require source separation	reduces quantity of waste disposed					√	Screen on basis of conflict with government policy
8.3	Processing third bag waste in a Mixed Waste Processing and Composting Facility	N	N	N	N	proven	N/A	reduces quantity of waste disposed	√					Retain as core component which is required for processing of "third bag" of waste
8.4	Processing of single material streams (e.g. wood, tires etc) in custom designed facilities	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain as processing component that contributes to waste diversion
8.5	Replace collection and processing equipment and approach with world-wide state-of-the-art technology (from Japan, Germany, etc.)	GTA systems use state-of-the-art technology when upgrading				being proven on an on-going basis	N/A	some techniques will increase waste diversion				√		Retain as secondary long-term component on basis that new technologies may be developed to increase waste diversion
8.6	Use sophisticated sorting facilities which feed pyrolysis or gasification plants	does not exist in GTA				proven	conflicts with government policy in some cases	reduces quantity of waste disposed					√	Screen on basis that incineration is contrary to provincial legislation

Component #	Components	Existing or Committed in GTA Regions: Durham	Peel	Metro	York	Screening Criteria: Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Screening Conclusion: Core	Enhancement: Primary	Secondary: Immediate	Secondary: Long Term	Screened Out	Rationale
RESIDENTIAL														
9.0	**Residential Recycling Depots/Transfer Stations**													
9.1	Provide adequate depots for all neighbourhoods in GTA to complement existing Blue Box system (located at transfer stations, landfill sites, etc.)	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides an increased opportunity for waste diversion
9.2	Drop-off depot system for dry recyclables and other (e.g. bulky) materials	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides an increased opportunity for waste diversion
9.3	Drop-off depots for all household organics (food, other wet wastes and garden wastes)	N	N	N	N	proven	N/A	reduces quantity of waste disposed		√				Retain on basis that the component provides an increased opportunity for organic waste diversion
10.0	**Residential Regulation**													
10.1	Develop requirement that all waste received at landfill must be from designated processing facilities (no unprocessed waste to landfill)	N	N	N	N	proven	N/A	reduces quantity of waste disposed			√			Retain as secondary immediate enhancement as potential method of increasing residential waste diversion
10.2	Mandatory source separation (3Rs) by residential sector	exists in Halton				proven	N/A	strategy increases waste diversion			√			Retain as potential method of increasing participation in source separation programs
10.3	Landfill bans on a variety of materials	Y	Y	Y	Y	proven in GTA	N/A	reduces quantity for disposal		√				Retain on basis that the component encourages increased recycling and therefore contributes to waste diversion
10.4	Flow control (delivery of residential waste to designated facilities)	does not exist in GTA				implementation being overturned in U.S.	conflicts with government policy	does not necessarily reduce quantity					√	Screen on basis of conflict with government policy
10.5	Require municipalities in GTA to achieve designated diversion targets	not currently enforced at municipal level				proven	N/A	may assist in reducing quantity			√			Retain as immediate secondary component on basis that mandatory targets increase diversion
10.6	Require municipalities in GTA to establish effective waste generation and diversion monitoring systems	in place for residential but not IC&I sector				proven	N/A	may assist in reducing quantity of waste disposed			√			Retain as immediate secondary component on basis that good feedback increases system performance
10.7	Ban non-recyclable packaging products	not currently enforced at municipal level				effects not proven or quantified	N/A	may assist in reducing quantity of waste disposed					√	Screen on basis of unproven results of policy
10.8	Change compost quality standards to allow more widespread use of compost	provincial jurisdiction				unproven	inconsistent with stated government policy	strategy likely to reduce quantity of waste requiring landfill					√	Screen on basis of inconsistency with government policy
11.0	**Residential Programs**													
11.1	Reduce garbage collection frequency	Y	Y	Y	Y	proven	N/A	likely decreases quantity of waste disposed		√				Retain on basis that the component currently exists and is likely to increase waste diversion
11.2	Set-out limit (bag limit) for garbage collection	N	N	N	Y	proven	N/A	likely decreases quantity of waste disposed		√				Retain on basis that the component currently exists and may increase waste diversion

Component #	Components	Existing or Committed in GTA Regions				Screening Criteria			Screening Conclusion					
		Durham	Peel	Metro	York	Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Core	Enhancement: Primary	Enhancement: Secondary: Immediate	Enhancement: Secondary: Long Term	Screened Out	Rationale
RESIDENTIAL														
11.0	**Residential Programs**													
11.3	Reduce frequency of recyclables collection	Y	N	Y	N	proven	frequency at half of garbage collection frequency meets 3Rs Regulations	does not increase waste diversion					√	Screen on basis of failure to reduce waste requiring final disposal
11.4	Allow residences to refuse delivery of unwanted "junk mail"	on voluntary basis in GTA				not quantified	N/A	may reduce disposal			√			Retain on basis of potential source reduction of junk mail
11.5	Reject loads with visible designated materials	Y	Y	Y	Y	proven	N/A	would reduce disposed waste			√			Retain on basis that the component reduces disposal of recyclable materials
11.6	Develop landfill management practices which utilize disposed waste as cover material	N	N	N	N	proven	N/A	strategy preserves landfill capacity			√			Retain on basis that component "reuses" waste materials as a resource
11.7	Produce compost on-site for landfill cover and preserve capacity	N	N	N	N	proven	N/A	strategy preserves landfill capacity			√			Retain on basis that component displaces borrow material as daily cover in landfill
11.8	Volume based disposal fees	N	N	N	N	proven	N/A	may reduce quantities received			√			Retain on basis that the component encourages increased diversion of low density materials
11.9	Disposal surcharges on some items (e.g. tires, white goods etc)	Y	Y	Y	Y	proven	N/A	may reduce quantities received		√				Retain on basis that component exists and provides an economic incentive to increased waste diversion
11.10	Landfill mining to recover materials	N	N	N	N	proven	N/A	strategy preserves landfill capacity but does not directly reduce quantity of waste requiring disposal					√	Screen on basis that the component does not meet third criterion; however strategy is of value to preserve landfill capacity
11.11	Establish scavenging centres at all landfills	N	N	N	N	proven	may contravene local by-laws	quantity of recoverable material may be small but component considered of value					√	Screen on basis of potential conflict with local by-laws; local by-laws that prevent scavenging should be reviewed, as scavenging provides opportunity for some increased waste diversion
11.12	Differential tipping fees based on degree of processing or waste composition	Y	Y	Y	Y	proven	N/A	strategy encourages processing and increases quantity diverted		√				Retain on basis that component exists and contributes to waste diversion

Component #	Components	Existing or Committed in GTA Regions				Screening Criteria			Screening Conclusion					
		Durham	Peel	Metro	York	Unproven Technology or Techniques	Strategy Fails to Satisfy Government Regulations and Standards	Strategy Does Not Reduce Quantity of Waste Requiring Final Disposal	Core	Enhancement: Primary	Enhancement: Secondary: Immediate	Enhancement: Secondary: Long Term	Screened Out	Rationale
RESIDENTIAL														
12.0	Residential Promotion/Education													
12.1	Strong 3Rs educational programs at all educational institutions (schools, universities, colleges etc.)	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed, but difficult to measure extent			√			Retain on basis that component encourages participation leading to increased waste diversion (now and in the future)
12.2	Develop strong consumer education program to encourage bulk buying, refuse excess packaging, promote re-use, buy recycled, promote refillable containers etc.	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed, but difficult to measure extent		√				Retain on basis that component exists and contributes to source reduction and waste diversion
12.3	Develop strong homeowner education program to focus on pre-cycling, backyard composting, grass-cycling, Direct Cost, Expanded Blue Box, Wet/Dry, reuse, etc.	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed, but difficult to measure extent		√				Retain on basis that component contributes to behaviour change and increased waste diversion
12.4	Support community based educational program such as neighbourhood composting (e.g. Port Colborne)	Y	Y	Y	Y	proven	N/A	reduces quantity of waste disposed, but difficult to measure extent		√				Retain on basis that component encourages community activity, increases interest, awareness and participation in waste diversion activities
13.0	Residential Economic Incentives													
13.1	Direct Cost system for garbage collection at curbside (fixed per bag rate, variable rate, weight based, etc.)	Direct Cost not in place at this time				proven	N/A	reduces quantity of waste disposed	√					Retain on basis that component provides visible economic incentive to increased waste diversion
13.2	Financial incentives to purchase durable products	not in place				unproven	N/A	difficult to design and administer programs to achieve waste reduction. Difficult to monitor waste reduction that is achieved due to these policies specifically.					√	Screen on basis that strategy is unproven because ability of this type of policy to achieve waste reduction is not known and if implemented it would be difficult to monitor results achieved
13.3	Grant programs to support source reduction in residential sector	in place				proven, but hard to measure	N/A	assumed to reduce quantity of waste disposed			√			Retain on basis of assumed waste diversion potential
13.4	Full cost accounting forcing municipalities to charge the full or total cost of waste management	landfill charges in GTA reflect total cost				proven	N/A	reduces quantity of waste disposed			√			Retain on basis that charging full costs of waste management would provide increased incentive to waste diversion

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RESIDENTIAL														
14.0	**Residential Market Development Policies**													
14.1	Integrate waste diversion with economic development programs to create markets for secondary materials	not in place				under consideration in many jurisdictions	N/A	over long-term, policy would stimulate secondary materials markets locally				√		Retain as long term secondary component on basis that component appears to have potential to reduce waste, although specific impact on GTA waste diversion is uncertain
14.2	Mandate product stewardship with requirement for market development	not in place				proven in Germany that packaging stewardship program needs market development component	consistent with government policy	increases recovery thereby reduces quantity of waste to disposal			√			Retain on basis that component reduces waste to final disposal
IC&I														
15.0	**IC&I Hauling, Recycling and Storage**													
15.1	Expand Blue Box system to cover all IC&I facilities that want to participate, with focus on institutional and commercial	N	Y	Y	N	proven	N/A	reduces quantity of waste disposed			√			Retain on basis that component would provide increase diversion by providing increased opportunities to recycle
15.2	Provision of bins at major IC&I facilities (e.g. hospitals, schools, shopping malls, etc.)	not provided in comprehensive manner				proven	N/A	likely to decrease quantity of waste disposed			√			Retain on basis that recovery would increase through convenient opportunities to recycle
15.3	Collection of source separated dry recyclables	in place				proven	N/A	likely to decrease quantity of waste disposed	√					Retain on basis that component exists and contributes to waste diversion
15.4	Collection of commingled dry recyclables from IC&I sector	in place				proven	N/A	likely to decrease quantity of waste disposed	√					Retain on basis that component exists and contributes to waste diversion
15.5	Collection of source separated organics from IC&I sector	in place				proven	N/A	likely to decrease quantity of waste disposed	√					Retain on basis that component exists and contributes to waste diversion
15.6	Collection of mixed waste from IC&I sector	in place				proven	N/A	reduces quantity disposed if subsequently processed and marketed		√				Retain on basis that component currently exists. If material is processed, contributes to waste diversion
15.7	Long term storage of dry IC&I recyclables until recycling technologies developed and/or profitable/stable markets developed	does not exist in GTA				unproven	no apparent conflict with government policy	impact on diversion uncertain					√	Screen on basis of unproven technology. Long term storage requirements would be significant, with uncertainty regarding future markets and processing technologies for some materials
15.8	Short term (3 to 6 month) storage of IC&I dry materials to take advantage of emerging recycling technologies and/or market prices	likely to exist informally in GTA				N/A	no apparent conflict with government policy	could reduce quantity of waste disposed			√			Assuming stringent storage conditions met, may ensure successful diversion of large quantities of materials

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										Primary	Secondary			
											Immediate	Long Term		
IC&I														
16.0	IC&I Composting													
16.1	On-site composting of IC&I organics (vermicomposters and other by restaurants, schools, grocery stores, etc.)	exists at some GTA facilities				proven	meeting health regulations may be difficult for many generators	reduces quantity of waste disposed		√				Retain on basis that component diverts waste
16.2	Centralized windrow composting of source separated organics	exists in GTA				proven, some intermittent odour problems	in some cases, odour problems occur, compost quality fails to meet MOEE guidelines for unrestricted use	reduces quantity of waste disposed		√				Retain on basis that component diverts organics subject to maintenance of process quality control
16.3	Centralized in-vessel composting of source separated organics	N	N	Y	N	proven	compost quality may present limitations for end uses	reduces quantity of waste disposed		√				Retain on basis that component diverts organics subject to maintenance of process quality control
16.4	Centralized composting of leaf and yard waste	exists in GTA				proven	compost quality may present limitations for end uses	reduces quantity of waste disposed		√				Retain on basis that component diverts organics subject to maintenance of process quality control
16.5	Use centralized anaerobic digesters	does not exist in GTA				proven	no apparent conflict with government policy	reduces quantity of waste disposed			√			Retain as immediate secondary component as a technical option to aerobic composting for diversion of IC&I organics
16.6	Centralized in-vessel composting of mixed IC&I waste	does not exist in GTA				unproven; generally not applicable to IC&I waste as 93% is dry	conflicts with MOEE 3Rs regulations	slight quantity reduction					√	Screen on basis of unproven technology and conflict with MOEE 3Rs Regulations
17.0	IC & I Reuse													
17.1	Ontario Waste Exchange	used by GTA generators				proven	N/A	reduces quantity of waste disposed		√				Retain on basis that component exists and has proven effective in waste diversion through reuse
18.0	IC & I Recycling Depots/Transfer Stations													
18.1	Provide adequate depots and transfer stations to be used by small IC&I generators, to compliment existing Blue Box system	used by GTA generators				proven	N/A	reduces quantity of waste disposed		√				Retain depots on basis that component provides increased opportunities to recycle

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IC&I														
19.0	MRFs/Processing for IC&I Sector													
19.1	Processing of source separated or commingled dry recyclables in a material recovery facility (MRF)	in GTA				proven	N/A	reduces quantity of waste disposed	√					Retain on basis that component exists, and is an essential element of existing successful waste diversion programs
19.2	Processing of mixed IC&I waste in a Mixed Waste Processing facility	not in GTA				proven	does not conflict with government policy assuming IC&I generators meet source separation requirements of MOEE 3Rs Regulations	reduces quantity of waste disposed	√					Retain on basis that component contributes to increased diversion of (predominantly dry) IC&I waste
19.3	Processing of single material streams (e.g. tire processing facility wood, tires, etc.) in custom designed facilities	in GTA				proven	N/A	reduces quantity of waste disposed		√				Retain on basis that component exists and contributes to waste diversion
19.4	Construction/demolition waste processing at specialized salvaging operations	in GTA				proven	N/A	reduces quantity of waste disposed		√				Retain on basis that component exists and contributes to waste diversion
19.5	Replace processing equipment and approach with state-of-the-art technology world wide (from Japan, Germany, etc.) as required	has occurred as required				only proven technologies should be used	assess on case-by-case basis	likely to contribute to increased waste diversion because of increased efficiency			√			Retain on basis that this approach contributes to increased waste diversion through increased process efficiencies
19.6	Food waste diversion through rendering, landspreading, hog farming, etc.	exists in GTA				proven	N/A	reduces quantity of waste disposed		√				Retain on basis that component exists and contributes to food waste diversion
20.0	IC&I Regulation													
20.1	Develop requirement that all waste received at landfill must be from designated processing facilities (no unprocessed waste to landfill)	proven				proven	N/A	would reduce quantity to landfill by encouraging diversion of processed waste	√					Retain on basis that component is an effective method of ensuring consideration of waste diversion by IC&I sector
20.2	Mandatory source separation of various IC&I recyclables (MOEE 3Rs Regulations as basis) by expanding list of IC&I generators	committed system includes this requirement for some generators				proven	N/A	reduces quantity of waste disposed	√					Retain on basis that component exists and contributes to IC&I waste diversion
20.3	Landfill bans on a variety of materials	in place in GTA				proven	N/A	reduces quantity disposed at GTA landfills		√				Retain on basis that component exists and contributes to IC&I waste diversion
20.4	Ban non-recyclable packaging and products	not in place in GTA				unproven	more effective if implemented at provincial or federal level	impacts on disposed waste quantities not known (may increase)					√	Screen on basis of uncertain and unproven waste diversion impacts

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										Primary	Secondary			
											Immediate	Long Term		
IC&I														
20.0	IC&I Regulation													
20.5	Require retailers and/or producers to establish recovery systems for designated products and packaging	not in place in GTA				this approach used in Germany (German Green Dot) France (Eco-Emballage), Belgium (FOST), U.K., and under consideration in Canada (CIPSI)	N/A	likely to reduce quantity going to landfill by increasing recycling opportunities			√			Retain on basis that component contributes to IC&I waste diversion
20.6	Deposit/refund system for soft drink containers	not in place in GTA				proven	N/A	reduces quantity to landfill			√			Retain on basis that component is likely to increase recovery of specified materials and contribute to waste diversion
20.7	Deposit/refund system for all beverage containers (liquor, juice, milk, water, etc.)	not in place in GTA				this system being considered (but not yet fully implemented) by a number of jurisdictions; unproven	N/A	reduces quantity to landfill					√	Screen on basis of unproven policy
20.8	Mandatory recovery rates and targets for specific materials	does not exist at this time				proven	N/A	reduces quantity of waste disposed			√			Retain on basis that component is likely to increase waste diversion through increased recovery
20.9	Change current health and safety regulations to allow more uses for food waste, and limit liability to encourage greater participation in food waste diversion by IC&I sector	does not exist at this time				not proven but appears to have potential	potential conflict with government policy	may increase food waste diversion and decrease quantity being disposed					√	Screen on basis that component requires amendments to existing legislation and likely conflicts with stated government regulations and standards
20.10	Change health and safety thresholds for use of secondary materials in food contact packaging or other products	under discussion provincially and federally at this time				impacts unproven, assumed to increase demand for recycled boxboard; under consideration by FDA (U.S.)	changes required to federal and provincial packaging standards; conflicts with government policy	impacts uncertain; assumed to increase demand for boxboard with recycled content, increasing market demand for fibres and therefore stimulate recycling					√	Screen on basis that component fails to meet current government policy and regulations
20.11	Change compost quality standards to allow more widespread use of compost	does not exist in GTA				impacts unproven	conflicts with current government standards	strategy could significantly reduce quantity to landfill by providing more opportunities for use of compost					√	Screen on basis that component conflicts with current government standards
20.12	Adopt product labelling system which promotes 3Rs	not in place; is currently implemented on voluntary basis				proven	N/A	impacts unproven					√	Screen on basis of unproven impact on waste diversion
20.13	Minimum secondary material content for packaging and products	is currently implemented on voluntary basis				unproven	N/A	impact unproven					√	May stimulate markets for secondary materials however screen on basis of unproven impacts on waste diversion

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IC&I														
20.0	**IC&I Regulation**													
20.14	Tax industries creating excess garbage and packaging	does not exist in GTA				unproven	N/A	impact unproven					√	Screen on basis of unproven impacts on waste diversion
20.15	Eliminate economic subsidies to industry	not in place in GTA				unproven	N/A	impact unproven					√	Screen on basis of unproven policy
20.16	Mandated levies or taxes to support 3Rs	not in place in GTA				proven	N/A	likely to increase diversion through increased financial support of 3Rs programs			√			Retain on basis that component is likely to contribute to waste diversion through increased financial support of 3Rs programs
20.17	Pass legislation against over-packaging	addressed on voluntary basis through NAPP				unproven	N/A	impact uncertain					√	Screen on basis of unproven policy
20.18	Ban use of polystyrene and similar products	does not exist in GTA				unproven	N/A	impact on waste diversion uncertain					√	Screen on basis of unproven policy, bans have been implemented but may result in increased waste generation (e.g. paper waste vs. polystyrene waste)
20.19	Tax on virgin materials to develop markets for secondary materials	not in place				unproven at this time	may contravene GATT, NAFTA, and be considered a trade barrier	impacts non-specific and unknown					√	Screen on basis of unproven policy which may not meet policy and regulations
20.20	Mandatory waste audits for IC&I generators	carried out on voluntary basis in GTA				proven to reduce waste quantities in some cases	N/A	reduces quantity of waste disposed, by making generators more aware of waste generation practices		√				Retain on basis that component is an essential tool for IC&I waste diversion planning, leading to increased IC&I waste diversion
20.21	Flow control (delivery of IC&I waste to designated facilities)	does not exist in GTA				implementation being overturned in US	conflicts with government policy	does not necessarily reduce quantity of waste disposed					√	Screen on basis of conflict with government policy
21.0	**IC&I Programs**													
21.1	Change approval process to require new IC&I facilities to design for reduction and re-use and submit a plan outlining these efforts prior to obtaining approval	in place in some GTA Regions				proven	N/A	likely to contribute to waste diversion in long-term			√			Retain on basis that the component encourages consideration of waste diversion in facility planning which will lead to waste diversion
21.2	Establishment of central food waste management organization to help food retailers to send excess food to food banks, or to animal feed if human consumption not viable	elements in place				not proven, but likely to be successful	there may be health and liability concerns which limit approach	if successful, waste to disposal would be reduced				√		Retain as long term secondary component on basis that if successful, would likely result in increased diversion of food waste
21.3	Allow locations to refuse delivery of unwanted "junk mail"	being practiced in GTA				proven	N/A	reduces quantity of waste disposed				√		Retain on basis of potential source reduction of junk mail
21.4	Develop and implement a material use guideline	in progress by MOEE				proven	N/A	likely to reduce quantity of waste disposed			√			Retain on basis that component provides options for beneficial use of materials that might otherwise be disposed. Content of guidelines will determine options for material management and impact on waste diversion

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IC&I														
22.0	**IC&I Promotion/Education**													
22.1	Strong 3Rs educational programs at all educational institutions (schools, universities, colleges etc)	education programs provided at some educational institutions in GTA				proven	N/A	likely to reduce quantity of waste disposed, particularly over long term			√			Retain on basis that component increases participation in existing waste diversion programs and will result in long term benefits (of consumer education)
22.2	Develop IC&I generator education program	all GTA Regions provide IC&I education programs				proven	N/A	likely to reduce waste over long-term		√				Retain on basis that component provides information on waste diversion and likely contributes to increased waste diversion achievements by generators
22.3	Develop environmental design program at schools and colleges	exists in GTA				proven	N/A	not proven that component directly reduces quantity disposed					√	Screen component on basis of unproven impacts on waste diversion
22.4	Establish databank on waste reduction technologies and system design	exists in GTA (RCO, and other sources)				proven	N/A	may indirectly reduce quantity disposed			√			Retain on basis that easy accessibility of data supports waste diversion
23.0	**IC&I Economic Incentives**													
23.1	Financial incentives to purchase durable products	not in place				unproven	N/A	likely to have minor impacts over long-term					√	Screen on basis that component is not proven; will probably have minor impacts and may be administratively cumbersome
23.2	Grant programs to support source reduction	not in place				proven	N/A	likely to have impacts over time			√			Retain on basis that component encourages increased source reduction activities leading to waste diversion
23.3	Economic incentives to encourage product re-design for durability, recyclability and refillability	not in place				unproven	N/A	likely to have impacts on waste diversion over long term					√	Screen on basis that component is not proven, will probably have minor impacts and may be administratively cumbersome
23.4	Self-imposed levies by producers to support 3Rs	under development in Ontario (CIPSI)				proven (German Green Dot)	N/A	would reduce quantity of waste disposed			√			Retain on basis that component contributes to waste diversion by providing financial support to recycling activities
23.5	Advanced disposal fee for larger wastes and special categories of waste	not in place in GTA				proven (Florida)	N/A	impacts unknown					√	Screen on basis that impacts are unknown
24.0	**IC&I Market Development Policies**													
24.1	Funding and incentives to recycling industries or other industries that utilize secondary materials	funded through MOEE				proven	N/A	direct impact on waste diversion likely to be positive			√			Retain on basis that component encourages development of markets for secondary materials
24.2	Funding incentives to product manufacturers to utilize secondary materials	exists to some extent				proven	N/A	diversion impacts not measured				√		Retain on basis that component supports development of markets for secondary materials

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IC&I														
24.0	IC&I Market Development Policies													
24.3	Provide manufacturer tax credits to end users of secondary materials	not in place at this time				unproven	N/A	impacts unknown					√	Screen on basis that component is unproven and impacts are unknown
24.4	Tax exemptions on recycling equipment	not in place at this time				unproven	N/A	may stimulate local recycling industry, but impacts on disposed quantities are uncertain					√	Screen on basis that component impacts are unknown and policy is unproven
24.5	Exempt recycled products from sales tax	not in place at in GTA				unproven, but assume that it stimulates sales of recycled products	N/A	not known if this would impact on diversion from GTA landfills (impacts not localized)					√	Screen on basis that impacts are not known (unproven)
24.6	Purchasing specifications to promote recycled content	in place by some private and public sector bodies in GTA (e.g. GIPPER)				proven	N/A	impact on GTA waste cannot be quantified			√			Retain on basis that component stimulates markets for secondary materials and contributes to waste diversion (although at this time, specific impacts on GTA waste are not measured)

Table 3.3

Potential Diversion Impacts of Secondary Enhancement Components

Component #	Component Description	Immediate	Long Term	Comments
1.6	Landfill ban on leaf and yard wastes, to force increased management on residential property	√		Leaf and yard waste make up 2%-11% of disposed residential waste and 2% of disposed IC&I waste in the GTA in 1992. A significant portion of this would be diverted through a ban.
1.7	Eliminate pick-up for leaf and yard waste (Oakville has implemented ban on grass pick-up)	√		Leaf and yard waste make up 2% to 11% of the residential waste stream disposed in the GTA in 1992. A significant portion of this would be diverted through a ban.
1.8	Increase use of refillable/reusable packaging and products	√		Should decrease packaging waste by 18% or more for overall reduction of 4.5% of waste stream. (See Schedule A)
1.9	Landfill bans on recyclable material	√		Assuming existing bans divert many IC&I recyclables, the policy would target residential recyclables. Recyclable materials make up 25% of the residential stream disposed. Assuming 70% of remaining recyclables were diverted through the bans; 17.5% diversion increment of residential stream would be achieved
1.10	Waste reduction planning requirements for construction/demolition projects	√		Would reduce C&D waste generation by at least 10%, with long term waste diversion benefits.
1.11	Procurement ordinances (favouring durable products, recycled content, and/or reusable purchases)	√		Strengthens markets for secondary materials and reusable containers. Impacts on diversion difficult to quantify.
1.16	Product redesign for increased product life and durability	√		Increased durability would decrease discard rate, thus increasing diversion through source reduction. Measure would apply mostly to durable goods (4-8% of disposed residential waste stream).

Component #	Component Description	Immediate	Long Term	Comments
1.17	Packaging redesign to reduce quantity and weight	√		Would result in slight decrease in packaging waste (assume 1.5% diversion increment).
1.19	Deposit/refund systems for a variety of materials	√		Ensures high recovery (from 80% to 95% see Schedule B) of materials involved. If applied to all glass, metal and plastic food and beverage containers (8-10% of the residential waste stream), incremental diversion would be 1.6-2% of residential waste stream.
1.24	Develop infrastructure for distribution of high quality food from catering facilities (e.g. Second Harvest)	√		Applicable to IC&I sector food waste. Potential to divert some (assume 10%) of 7% of IC&I sector waste which is food, i.e. 0.7% of the IC&I waste stream, 0.4% diversion of total waste stream.
1.28	Provide neighbourhood leaf shredders in fall	√		If shredders were provided to all neighbourhoods in GTA, would contribute to diversion of 0.2 to 1.4% of residential waste stream (2-11% leaf and yard waste, 25% of which is leaf waste. Assume 50% of this fraction.)
2.5	Collection of all dry recyclables in a 4-stream wet-dry system	√		Diversion impacts likely similar to 3-stream (around 60% of residential waste).
2.6	Collection of recyclables at all multi-family dwellings	√		Requirements of 3Rs Regulations will provide recycling service to all residents in multi-family dwellings of over 6 units. Adding the requirement that all multi-family dwellings be serviced would increase diversion by 1-2%, assuming that most multi-family residents will be served.
2.13	Curbside collection of household organics in a 4-stream wet-dry collection system	√		Diversion impacts likely similar to 3-stream (around 60% of residential waste).
6.1	Centralized windrow composting of source separated organics	√		Alternative processing approach for source separated organics. Potential to divert portion of 30% of residential and 9% of IC&I waste stream.

Component #	Component Description	Immediate	Long Term	Comments
6.2	Centralized windrow composting of mixed waste (third bag)	√		Alternative processing approach for "third bag" of mixed waste. Potential to divert from 33% to 39% of residential waste stream.
6.9	Use centralized anaerobic digesters	√		Alternative processing approach for source separated organics. Could contribute to diversion of some household and IC&I organic wet wastes, which make up 30% of residential waste and 9% of the IC&I waste stream.
8.5	Replace collection and processing equipment and approach with state-of-the-art technology world wide (e.g. Japan, Germany, etc.)		√	Important design approach. Impact on diversion will depend on technique or technology being applied.
10.1	No unprocessed waste to landfill	√		Diversion should increase to over 60% for both residential and IC&I waste (see Chapter 13).
10.2	Mandatory source separation by residential sector	√		Residential diversion should increase by 20%. (Halton experience).
10.5	Require municipalities in GTA to achieve designated diversion targets	√		Diversion would likely increase. Level would depend on a number of factors (see Schedule A)
10.6	Require municipalities in GTA to establish effective waste generation and diversion monitoring systems	√		Information could facilitate design for increased diversion.
11.4	Allow residences to refuse delivery of unwanted "junk mail"	√		Can reduce residential waste by 1.6 to 2.3% assuming reduction of 50%, and generation rate of 15kg/cap/year.
11.5	Reject loads at landfill or transfer station with visible designated recyclable materials	√		Should encourage increased source separation and diversion.
11.6	Develop landfill management practices which utilize disposed waste as cover material	√		Increases landfill life, all material put to beneficial use could save a proportion of up to 20% of landfill capacity typically occupied by cover material.
11.7	Produce compost on-site for landfill cover to preserve capacity	√		Can divert quantities similar to central composting, and preserve landfill capacity. Suitable use for lower quality compost.
11.8	Volume based disposal fees	√		Provides incentive to decreased disposal. Impacts depend on fees chosen.

Component #	Component Description	Immediate	Long Term	Comments
12.1	Strong educational programs at all educational institutions (schools, universities, colleges, etc.)	√		Likely to reduce quantity of waste generated through increased awareness of waste management issues.
13.3	Grant programs to support source reduction in residential sector	√		Difficult to measure diversion impacts of this type of program; impacts assumed to be positive. If comprehensive program were implemented GTA wide could reduce residential waste stream by up to 1%.
13.4	Full cost accounting forcing municipalities to charge the full or total cost of waste management	√		Disposal costs of $50-70/tonne charged in GTA are likely close to full cost, therefore the effect of this policy may be minimal. Charging full cost of waste management to residents in Direct Cost System addressed elsewhere. Significantly increases diversion levels (to over 40%).
14.1	Integrate waste diversion with economic development programs to create markets for secondary materials		√	Development of local markets beneficial, by creating stable demand. Difficult to measure diversion impacts of this type of program; impacts assumed to be positive.
14.2	Mandate product stewardship with requirement for market development	√		Could result in recovery of 80% of packaging (25% of residential waste), some of which is currently diverted.
15.1	Expand Blue Box system to cover all IC&I facilities who want to participate, with focus on institutional and commercial	√		Should increase diversion by providing convenient opportunity for IC&I sector to recycle. Impact would depend on level and coverage of service.
15.2	Provision of bins at major IC&I facilities (e.g. hospitals, schools, shopping malls, etc.)	√		Would increase diversion by providing additional opportunities to recycle.
15.8	Short term (3 to 6 month) storage of IC&I dry materials to take advantage of emerging technologies and/or market prices	√		Contributes to diversion by providing protection against short term market problems. Impacts depend on materials involved.

Component #	Component Description	Immediate	Long Term	Comments
16.5	Use centralized anaerobic digesters	√		Alternative processing approach for source separated organics. Can contribute to diversion of 30% of residential waste and 9% of IC&I waste which is organic.
19.5	Replace collection and processing equipment and approach with state-of-the-art technology world wide (e.g. Japan, Germany, etc.) (same as 8.5)	√		Important design approach. Impact on diversion will depend on technique or technology being applied.
20.5	Require retailers and/or producers to establish recovery systems for designated products and packaging	√		Similar to Green Dot approach. Would contribute to diversion of 25% of residential waste.
20.6	Deposit/refund system for soft drink containers	√		Ensures high recovery, diversion of materials involved. If applied to beverage containers (2% of the residential waste stream) incremental diversion would be 0.2% to 0.4% of residential waste stream
20.8	Mandatory recovery rates and targets for specific materials	√		Increases waste diversion. Rate depends on material.
20.16	Mandated levies or taxes to support 3Rs	√		Provides source of funds to support 3Rs and therefore contributes to diversion. Impacts on waste diversion can be quantified when details of system scoped out.
21.1	Change approval process to require new IC&I facilities to design for reduction and re-use and submit a plan outlining these efforts prior to obtaining approval	√		Will have waste diversion impacts in longer term (impacts can not be quantified until details of policy scoped out).
21.2	Establishment of central food waste management organization to help food retailers to send excess food to food banks, or to animal feed if human consumption not viable		√	Can contribute to diversion of some IC&I food waste (7% of IC&I waste stream). Some portion of this could be diverted for human and animal consumption (% of food waste stream suitable for this purpose is not known).
21.3	Allow locations to refuse delivery of unwanted "junk mail"		√	Would increase diversion. Percentage of IC&I waste which is junk mail is not known.

Component #	Component Description	Immediate	Long Term	Comments
21.4	Develop and implement a material use guideline.	√		May strengthen markets/ uses for waste materials.
22.1	Strong educational programs at all educational institutions (schools, universities, colleges, etc.)	√		Likely to reduce quantity of waste generated through increased awareness of waste management issues.
22.4	Establish databank on waste reduction technologies and system design	√		Will benefit waste diversion by providing easy access to information. Direct impacts on waste diversion can not be quantified.
23.2	Grant program to support source reduction.	√		Would benefit generators who receive grant, and could possibly help new technologies which source reduce waste. Impacts would depend on grant recipients, and could be estimated on a case-by-case basis.
23.4	Self-imposed levies by producers to promote 3Rs	√		Would contribute to increased diversion. Impact depends on products levied, funds available, and how funds are used.
24.1	Funding and incentives to recycling industries and other industries that utilize secondary materials	√		Would stabilize markets for secondary materials, contributing to sustainability of 3Rs systems.
24.2	Funding incentives to product manufacturers to utilize secondary materials		√	Would stabilize markets for secondary materials, contributing to sustainability of 3R's systems.
24.6	Purchasing specifications to promote recycled content	√		Would stabilize markets for secondary materials, contributing to sustainability of 3R's systems.

Table 3.4
Inclusion of Core and Primary Enhancement Components in Residential and IC&I Systems

	Components	Components Category		Systems in which Component Included											
				Residential*						IC&I**					
		Core	Primary Enhancement	1	2	3	4	5	6	1	2	3	4	5	6
RESIDENTIAL															
1.0 Reduction and Reuse (Residential and IC&I)															
1.1	Funding/distribution of source reduction equipment (backyard composters, cloth shopping bags etc.)		√	√	√	√	√	√	√						
1.2	Create waste reduction offices in each Region with the primary objective of promoting reduction and reuse		√	√	√	√	√	√	√						
1.3	Establish community-based (i.e. municipal, non-profit, charitable, etc.) reuse/ repair and goods exchange centres		√	√	√	√	√	√	√						
1.4	Support the efforts of charitable organizations and food reuse organizations		√	√	√	√	√	√	√						
1.5	Promotion of grass-cycling and xeriscaping		√			√	√	√	√						
1.13	Promotion/education for school children focusing on waste reduction		√	√	√	√	√	√	√						
1.14	Economic incentives such as Direct Cost for garbage disposal (see later section on economic incentives)	√				√									
1.15	Promotion/education program for consumers focusing on purchasing habit changes to minimize waste generation (for example bulk buying, borrowing items, buying products in recyclable packaging etc)		√			√			√						
1.18	Promote reuse (refillable packages, reuse centres)		√			√	√	√	√						
1.20	Hold community source reduction workshops		√			√	√	√	√						
1.21	Develop "pre-cycling" campaign		√			√	√	√	√						
1.22	Develop award system to recognize waste reduction achievements		√	√	√	√	√	√	√						
1.23	Organize SWAP days or neighbourhood garage sales		√	√	√	√	√	√	√						

* Residential Systems: 1=Existing, 2=Existing/Committed, 3=Direct Cost, 4=Expanded Blue Box, 5=Wet/Dry, 6=Mixed Waste Processing.
** IC&I Systems: 1=Existing, 2=Existing/Committed, 3=Extended 3Rs Regulations, 4=Expanded 3Rs Regulations, 5=Expanded 3Rs Regulations with Organics, 6= No Unprocessed Waste to Landfill.

	Components	Components Category		Systems in which Component Included											
				Residential*						IC&I**					
		Core	Primary Enhancement	1	2	3	4	5	6	1	2	3	4	5	6
RESIDENTIAL															
1.0 Reduction and Reuse (Residential and IC&I)															
1.25	Use food waste as animal feed		√	√	√	√	√	√	√	√	√	√	√	√	√
1.26	Landspread food waste		√	√	√	√	√	√	√	√	√	√	√	√	√
2.0 Residential Recycling and Collection															
2.1	Curbside collection of Blue Box materials	√		√	√	√	√	√	√						
2.2	Curbside collection of Expanded Blue Box materials (ONP, OCC, boxboard, PET, HDPE, film and other plastics, glass, aluminum, tinplate steel, mixed paper, fine paper, textiles)	√					√								
2.4	Collection of all dry recyclables and waste in a 3-stream wet-dry system	√						√							
2.7	Recycling services to all rural households in GTA (depot, curbside)		√	√	√	√	√	√	√						
2.8	Drop-off depot system for dry recyclables and other (e.g. bulky) materials		√	√	√	√	√	√	√						
2.10	Curbside collection of wet household kitchen waste		√					√							
2.12	Curbside collection of household organics in a 3- stream wet/dry collection system	√						√							
2.14	Special/separate collections at curbside		√	√	√	√	√	√	√						
2.15	Collection of dry recyclables from multi-family buildings containing 6 or more units		√		√	√	√	√	√						
2.16	Collection of 3rd bag of waste (garbage remaining after source separation of dry recyclables and leaf and yard waste) for further processing	√							√						
3.0 Residential Leaf and Yard Waste Collection															
3.1	Seasonal curbside collection of leaf and yard waste		√	√	√	√	√	√	√						
3.2	Drop-off depots for leaf and yard wastes		√	√	√	√	√	√	√						
4.0 Residential Household Composting															
4.1	Distribution/provision of backyard composters for backyard composting by single family residents		√	√	√	√	√	√	√						
4.2	Backyard composting (large 3-bin units) for multi-family residents		√	√	√	√	√	√	√						
4.3	Vermicomposting by multi-family residents		√	• √	√	√	√	√	√						

* Residential Systems: 1=Existing, 2=Existing/Committed, 3=Direct Cost, 4=Expanded Blue Box, 5=Wet/Dry, 6=Mixed Waste Processing.
** IC&I Systems: 1=Existing, 2=Existing/Committed, 3=Extended 3Rs Regulations, 4=Expanded 3Rs Regulations, 5=Expanded 3Rs Regulations with Organics, 6= No Unprocessed Waste to Landfill.

	Components	Components Category		Systems in which Component Included											
				Residential*						ICI**					
		Core	Primary Enhancement	1	2	3	4	5	6	1	2	3	4	5	6
RESIDENTIAL															
5.0 Other Residential Waste Diversion															
5.1	Household hazardous waste (including mobile HHW depots)		√	√	√	√	√	√	√						
5.2	Toxic taxi		√	√	√	√	√	√	√						
5.3	White goods collection and drop-off		√	√	√	√	√	√	√						
5.4	Special/separate collections at curbside for bulky waste (white goods, furniture, Christmas trees, etc)		√	√	√	√	√	√	√						
6.0 Composting/Anaerobic Digestion Facilities															
6.4	Centralized in-vessel composting of source separated organics	√						√							
6.5	Centralized in-vessel composting of mixed waste (third bag)	√							√						
6.7	Community composting/gardening projects		√	√	√	√	√	√	√						
6.8	Centralized windrow composting of leaf and yard waste	√		√	√	√	√	√	√						
7.0 Reuse Centres															
7.1	Social Service Centres (i.e. Goodwill)		√	√	√	√	√	√	√						
8.0 Processing of Dry Materials															
8.1	Processing of source separated or commingled dry recyclables in material recovery facility (MRF) (improved or expanded as required)	√		√	√	√	√	√	√						
8.3	Processing third bag waste in a Mixed Waste Processing and Composting Facility	√							√						
8.4	Processing of single material streams (e.g. wood, tires etc) in custom designed facilities		√	√	√	√	√	√	√						
9.0 Residential Recycling Depots/Transfer Stations															
9.1	Provide adequate depots for all neighbourhoods in GTA to complement existing Blue Box system (located at transfer stations, landfill sites, etc.)		√		√	√	√	√	√						
9.2	Drop-off depot system for dry recyclables and other (e.g. bulky) materials		√	√	√	√	√	√	√						
9.3	Drop-off depots for all household organics (food, other wet wastes and garden wastes)		√					√							
10.0 Residential Regulation															
10.3	Landfill bans on a variety of materials		√	√	√	√	√	√	√						

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** IC&I Systems: 1=Existing, 2=Existing/Committed, 3=Extended 3Rs Regulations, 4=Expanded 3Rs Regulations, 5=Expanded 3Rs Regulations with Organics, 6= No Unprocessed Waste to Landfill.

	Components	Components Category		Systems in which Component Included											
				Residential*						IC&I**					
		Core	Primary Enhancement	1	2	3	4	5	6	1	2	3	4	5	6
RESIDENTIAL															
11.0 Residential Programs															
11.1	Reduce garbage collection frequency		√	√	√	√	√	√	√						
11.2	Set-out limit (bag limit) for garbage collection		√	√											
11.9	Disposal surcharges on some items (e.g. tires, white goods etc)		√	√	√	√	√	√	√						
11.12	Differential tipping fees based on degree of processing or waste composition		√	√	√	√	√	√	√						
12.0 Residential Promotion/Education															
12.2	Develop strong consumer education program to encourage bulk buying, refuse excess packaging, promote re-use, buy recycled, promote refillable containers etc.		√			√	√	√	√						
12.3	Develop strong homeowner education program to focus on pre-cycling, backyard composting, grass-cycling, Direct Cost, Expanded Blue Box, Wet/Dry, reuse, etc.		√			√	√	√	√						
12.4	Support community based educational program such as neighbourhood composting (e.g. Port Colborne)		√			√	√	√	√						
13.0 Residential Economic Incentives															
13.1	Direct Cost system for garbage collection at curbside (fixed per bag rate, variable rate, weight based, etc.)	√				√									
IC&I															
15.0 IC&I Hauling, Recycling and Storage															
15.3	Collection of source separated dry recyclables	√								√	√	√	√	√	√
15.4	Collection of commingled dry recyclables from IC&I sector	√								√	√	√	√	√	√
15.5	Collection of source separated organics from IC&I sector	√								√	√	√	√	√	√
15.6	Collection of mixed waste from IC&I sector		√							√	√	√	√	√	√

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** IC&I Systems: 1=Existing, 2=Existing/Committed, 3=Extended 3Rs Regulations, 4=Expanded 3Rs Regulations, 5=Expanded 3Rs Regulations with Organics, 6= No Unprocessed Waste to Landfill.

	Components	Components Category		Systems in which Component Included											
				Residential*						IC&I**					
		Core	Primary Enhancement	1	2	3	4	5	6	1	2	3	4	5	6
IC&I															
16.0	**IC&I Composting**														
16.1	On-site composting of IC&I organics (vermicomposters and other by restaurants, schools, grocery stores, etc.)		√							√	√	√	√	√	√
16.2	Centralized windrow composting of source separated organics		√							√	√	√	√	√	√
16.3	Centralized in-vessel composting of source separated organics		√											√	
16.4	Centralized composting of leaf and yard waste		√							√	√	√	√	√	√
17.0	**IC&I Reuse**														
17.1	Ontario Waste Exchange		√							√	√	√	√	√	√
18.0	**IC&I Recycling Depots/Transfer Stations**														
18.1	Provide adequate depots and transfer stations to be used by small IC&I generators, to compliment existing Blue Box system		√								√	√	√	√	√
19.0	**MRFs/Processing for IC&I Sector**														
19.1	Processing of source separated or commingled dry recyclables in a material recovery facility (MRF)	√								√	√	√	√	√	√
19.2	Processing of mixed IC&I waste in a Mixed Waste Processing facility	√													√
19.3	Processing of single material streams (e.g. tire processing facility wood, tires, etc.) in custom designed facilities		√							√	√	√	√	√	√
19.4	Construction/demolition waste processing at specialized salvaging operations		√							√	√	√	√	√	√
19.6	Food waste diversion through rendering, landspreading, hog farming, etc.		√							√	√	√	√	√	√
20.0	**IC&I Regulation**														
20.1	Develop requirement that all waste received at landfill must be from designated processing facilities (no unprocessed waste to landfill)	√													√
20.2	Mandatory source separation of various IC&I recyclables (MOEE 3Rs Regulations as basis) by expanding list of IC&I generators	√										√	√	√	

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	Components	Components Category		Systems in which Component Included											
				Residential*						IC&I**					
		Core	Primary Enhancement	1	2	3	4	5	6	1	2	3	4	5	6
IC&I															
20.0 IC&I Regulation															
20.3	Landfill bans on a variety of materials		√							√	√	√	√	√	√
20.20	Mandatory waste audits for IC&I generators		√								√	√	√	√	√
22.0 IC&I Promotion/Education															
22.2	Develop IC&I generator education program		√									√	√	√	√

* Residential Systems: 1=Existing, 2=Existing/Committed, 3=Direct Cost, 4=Expanded Blue Box, 5=Wet/Dry, 6=Mixed Waste Processing.
** IC&I Systems: 1=Existing, 2=Existing/Committed, 3=Extended 3Rs Regulations, 4=Expanded 3Rs Regulations, 5=Expanded 3Rs Regulations with Organics, 6= No Unprocessed Waste to Landfill.

4.0 RESIDENTIAL WASTE GENERATION AND COMPOSITION ESTIMATES

4.1 General

This chapter presents historical residential waste generation data, residential waste generation estimates and estimates of the composition of residential waste generated and disposed in 1992 for each GTA Region. As future waste generation estimates are tied to population, population projections are also discussed. Generation and composition estimates for the IC&I sector are presented in Chapter 12 of this Appendix.

4.2 Residential Waste Generation Estimates and Projections

4.2.1 Approach

An analysis of available historical residential waste generation, diversion and disposal data for each Region within the study area was conducted to determine the residential waste generation rates on a tonnes/capita/year basis upon which the residential waste quantity projections were based. Projected populations for each Region were multiplied by the residential waste generation rate to estimate future residential waste generation (in tonnes/year).

Quantities of residential waste diverted in each Region included tonnes of dry materials reported to be diverted through curbside Blue Box and depot programs, materials collected through leaf and yard waste collection programs, and miscellaneous other residential waste diversion programs such as white goods collection, etc. Materials collected through various wet/dry pilot projects were also included in diversion totals, when data were available. The number of backyard composters in each region was multiplied by an assumed diversion rate of 169 kg/composter/year (see Chapter 5 for rationale) to estimate the diversion through backyard composters. It was assumed that there was no export of residential waste, and that the quantities disposed at landfill, added to estimates by regional staff of residential waste quantities diverted, provide a reasonably accurate estimate of residential waste generation for each of the years 1986 to 1992.

4.2.2 Population Data and Forecasts

Historical population data for each GTA Region for 1986 - 1992 were obtained from Hardy Stevenson and Associates (HSA, 1994). The 1986 and 1991 data were obtained from 1986 and 1991 Statistics Canada Census data, and the data for the non-census years were obtained from Regional Assessments and lower-tier municipalities.

Population projections for 1993 - 2015 (HSA, 1994) are presented in Table 4.1. The primary data source upon which these are based was Scenario 1 of the "The Outlook for Population and Employment in the GTA", prepared by Hemson Consulting Ltd. and the Coopers and Lybrand Group for the Office of the Greater Toronto Area, August 1993. The Region of Durham information was obtained from the Commissioners Report to Planning Committee (Report 93-P-128), December 14, 1993. The Region of York information was obtained from Report No. 7 of the Regional Official Plan Steering Committee, October, 1993.

The number of households, by dwelling type and region, are presented in Table 4.2. Households are categorized as single-detached, high-rise apartment, and semi-detached and low-rise (which includes low-rise, townhouses, duplexes etc.). The values presented in the table were prepared based on a number of data sources including:

Table 4.1
GTA Regions
Population Data and Projections
1991 to 2015

Year	Durham	Metro Toronto	York	Peel	Halton
1991	409,070	2,275,771	504,981	732,798	313,136
1992	421,014	2,289,798	524,296	755,178	322,467
1993	433,307	2,303,912	544,349	778,242	332,075
1994	445,959	2,318,113	565,170	802,010	341,970
1995	458,980	2,332,401	586,786	826,504	352,160
1996	472,382	2,346,778	609,230	851,745	362,653
1997	486,175	2,361,243	632,532	877,758	373,459
1998	500,370	2,375,797	656,725	904,565	384,587
1999	514,980	2,390,441	681,844	932,191	396,046
2000	530,017	2,405,175	707,923	960,661	407,847
2001	545,493	2,420,000	735,000	990,000	420,000
2002	561,420	2,431,741	752,824	1,004,943	429,885
2003	577,813	2,443,538	771,080	1,020,112	440,002
2004	594,684	2,455,393	789,778	1,035,510	450,357
2005	612,048	2,467,305	808,931	1,051,140	460,957
2006	629,919	2,479,274	828,547	1,067,005	471,805
2007	648,312	2,491,302	848,639	1,083,111	482,909
2008	667,241	2,503,389	869,219	1,099,459	494,274
2009	686,724	2,515,534	890,297	1,116,055	505,907
2010	706,775	2,527,737	911,887	1,132,900	517,814
2011	727,412	2,540,000	934,000	1,150,000	530,000
2012	748,651	2,555,564	949,405	1,160,554	540,929
2013	770,511	2,571,223	965,064	1,171,204	552,082
2014	793,009	2,586,978	980,981	1,181,952	563,466
2015	816,163	2,602,830	997,161	1,192,798	575,084

Source: Social Environment Technical Appendix, May, 1994

Table 4.2
GTA Regions
Households by Dwelling Type
1991-2015

	Single-Detached	High-rise Apartment	Semi and Low Rise	Total
1991				
Metro	287,477	309,942	267,136	864,555
Durham	94,005	10,750	31,385	136,140
York	120,145	11,395	18,945	150,485
Peel	113,425	53,570	62,675	229,670
Halton	69,863	15,666	20,891	106,420
Total GTA	684,915	401,323	401,032	1,487,270
1992				
Metro	289,330	315,283	270,408	875,021
Durham	97,269	11,275	32,287	140,831
York	128,466	13,283	19,905	161,654
Peel	117,152	55,039	64,584	236,775
Halton	73,258	16,374	21,954	111,586
Total GTA	705,475	411,254	409,138	1,525,867
2000				
Metro	302,259	358,683	295,775	956,717
Durham	126,086	16,284	39,967	182,336
York	164,403	33,905	22,094	220,402
Peel	155,302	69,944	84,025	309,272
Halton	95,314	20,759	29,073	145,146
Total GTA	843,364	499,575	470,934	1,813,873
2015				
Metro	313,499	470,762	347,404	1,131,665
Durham	205,880	34,746	66,050	306,675
York	241,877	58,776	30,178	330,831
Peel	202,992	102,862	111,265	417,119
Halton	140,208	29,476	46,578	216,263
Total GTA	1,104,456	696,621	601,475	2,402,552

Source: Social Environment Technical Appendix, May, 1994.

- 1991 Census data;
- Metro Toronto and Regional data for 1992/1993; and
- projections of population levels and Hemson/Coopers estimates of changes in household size over the planning period for each Region.

The 1991 Census inventory of housing by type was used as a base for analysis. Assumptions were made by Hardy Stevenson and Associates Ltd. with respect to the proportion of unit type (i.e. single-detached/semi-low-rise/high-rise). Based on these assumptions and Hemson/Coopers population projections, housing types were identified for each five year cohort. Total units and units by intervening years were interpolated Hardy Stevenson and Associates Ltd.

4.2.3 Residential Waste Generation Estimates for Region of Durham

Waste Disposal Data

Over 98% of Durham Region's waste is disposed of in Metro's Brock West landfill. There are two regionally owned landfill sites, Brock and Scott, which are currently operational. These handle less than 2 percent of Durham's solid waste. It is anticipated that the Scott landfill will reach capacity in 1994. The Brock site accepts waste only from Brock Township, and will close in approximately six years (Lombardo, Durham Works Dept., 1993). The Study Team obtained data for waste generated in Durham Region and disposed at the Brock West and Keele Valley landfills for the years 1986 through 1992 from Metro Toronto, and for 1987 through 1992 from Durham Regional staff. Tonnages for the smaller regional landfills were obtained from Durham Works Department.

The quantities of total Durham waste disposed at landfill as reported by Metro were somewhat higher than those reported by Durham Region. This difference is reportedly due to Durham waste being disposed at landfill by haulers who are not on Durham's approved list of haulers (Todd, M.M. Dillon Ltd., 1993). Apparently Metro keeps track of all of the waste passing over the weigh scales at their landfills, including the waste generated by Durham sources and disposed at Metro's landfill by haulers who are not on Durham's approved list. Durham Regional staff only keep track of the waste disposed at Metro landfills by their approved haulers (Collis, Region of Durham, 1993). The Study Team used Metro's totals, since these are higher and provide a more conservative estimate. For instance, in 1988 Durham reported 207,957 tonnes of waste landfilled by Durham sources, whereas Metro reported 285,875 tonnes disposed by Durham sources (residential and IC&I). The numbers for subsequent years show smaller differences.

The allocation of the total waste quantity data to residential and IC&I sources was provided by Region of Durham staff for 1986 to 1992, and by Metro Toronto staff for 1990 and 1991. The Region of Durham numbers for both residential and IC&I waste disposed were lower than the Metro Toronto numbers for all years. The Study Team used the Durham estimates for residential waste, and subtracted these from the numbers for total waste disposed (provided by Metro) to estimate the quantity of IC&I waste disposed. This method may allocate slightly too little waste generation to residential sources, and too much to IC&I, however, the difference is not expected to be significant. Historical waste generation, diversion and disposal data for Region of Durham for the years 1986 through 1992 are presented in Table 4.3.

Residential Waste Quantity Projections

Quantities of residential waste diverted from landfill were reported to the Study Team by Durham regional staff (Collis, Region of Durham, 1993). The residential waste diverted was added to the residential waste quantities sent to landfill to estimate the total residential waste

Table 4.3
Region of Durham
Residential Waste Management History

Year	Population	Residential Generation (Tonnes)	Residential Generation Rate (T/Cap/Yr)	Residential Diversion Rate %	RESIDENTIAL DIVERSION (Tonnes) Total Residential Diversion	Green Waste	Backyard Compost	Blue Box	Igloo & Container	Other	WASTE LANDFILLED Residential (Durham #s) (Tonnes)	ICI (by differ.) (Tonnes)	Total (Metro #s) (Tonnes)	*As reported by Durham (Tonnes)*
1986	326,179	*101,115*	*0.31*	0.00	0						101,115	152,125	253,240	
1987	340,570	104,634	0.31	4.35	4,550					4,550	100,084	161,826	261,910	*215,479*
1988	347,837	112,036	0.32	10.68	11,970			11,970			100,066	190,509	290,575	*207,957*
1989	385,480	126,049	0.33	15.82	19,939	2,274		16,087		1,578	106,110	189,353	295,463	*225,070*
1990	397,540	132,587	0.33	18.77	24,890	2,100	525	20,459	1,788	18	107,697	190,264	297,962	*240,364*
1991	409,070	137,994	0.34	23.02	31,769	2,214	3,301	20,841	810	4,604	106,225	118,694	224,919	*183,922*
1992	421,014	140,078	0.33	26.40	36,987	8,045	3,794	17,166	2,077	5,905	103,091	62,615	165,706	*121,573*
		Average =	*0.33 (excl. 1986)*											

Notes:

1) Population data: Social Environment Technical Appendix, 1994.
2) For the 1992 "other" category, diversion figures provided for January - June 1992 were doubled. This includes 613.5 tonnes of recyclables from transfer stations.
3) OMMRI numbers used for Blue Box diversion estimates for 1990 and 1991.
4) The 1987 residential generation rate was applied to the 1986 population to calculate residential waste generated for 1986.

Assumptions:

- Landfill numbers for Durham, as reported by Metro, are assumed to be correct.
- the discrepancy between Region of Durham landfill numbers and Metro landfill numbers is due to loads delivered by haulers not on Durham's approved list.
- the residential quantities reported by Durham are assumed to be correct. The difference between Durham and Metro numbers is assumed to be IC&I waste.
- the Blue Box Program began in 1988.
- backyard composters divert 169 tonnes/composter/year

generated. The residential waste generated was divided by the population to give the residential generation rate (in tonnes/capita/year). The residential waste generation rate calculated by this method was 0.31 tonnes/capita/year (t/c/y) for 1987, and 0.32 t/c/y for 1988. The generation rates for 1989 and 1990 remained constant at 0.33 t/c/y, increased to 0.34 in 1991 and decreased to 0.33 in 1992. The average value of 0.33 t/c/y (excluding 1986) was used for the residential waste quantity projections.

Residential waste generation was estimated by applying the average residential waste generation rate of 0.33 t/c/y to future population projections. This calculation has assumed that residential waste generation rates will remain constant (on a per capita basis) until the year 2015. In Regional projections presented in Chapter 15 of this Appendix, the effects of potential source reduction measures on net residential waste generation are taken into account.

Residential waste generation projections for the Region of Durham for the years 1993 to 2015 are presented in Table 4.4. The table shows that residential waste generation in the Region is estimated to increase from 142,991 tonnes in 1993 to 269,334 tonnes in the year 2015.

4.2.4 Residential Waste Generation Estimates for Metropolitan Toronto

Metropolitan Toronto Waste Disposal Data

Approximately 70% of Metro Toronto waste is disposed at the Keele Valley landfill site, and the remainder is disposed at the Brock West landfill. The Study Team obtained data for waste generated in Metropolitan Toronto and disposed at Brock West and Keele Valley landfills for the years 1986 through 1992 from the Metro Works Department (Scanga, Metro Works, 1993).

The allocation of waste to residential and IC&I sources was provided by Metro Toronto staff. The historical data for 1986 through 1992 are presented in Table 4.5.

Residential Waste Quantity Projections

The estimated residential waste generated was divided by the population to give the residential generation rate (in t/c/y). The generation rate remained relatively constant between 1986 and 1992. The estimated residential generation rate was 0.46 t/c/y for 1986, 0.48 for 1987 and 1988, 0.50 for 1989, 0.49 for 1990, 0.44 for 1991, and 0.47 for 1992. The average value of 0.48 t/c/y was used for the residential waste quantity projections. This rate is higher than the residential rates calculated for other GTA Regions. However, it includes some light commercial waste, which is a significant component (up to 25% in the case of City of Toronto) of the "residential" waste delivered to Metro landfills by member municipalities.

Comments received from City of Toronto during the public consultation process provided information on the quantities of IC&I waste which they manage.

Residential waste generation projections were estimated by applying the average residential waste generation rate of 0.48 t/c/y to future population projections. This calculation has assumed that residential waste generation rates will remain constant (on a per capita basis) until the year 2015. In Regional projections presented in Chapter 15 of this Appendix, the effects of potential source reduction measures on net residential waste generation are taken into account.

Residential waste generation projections for Metropolitan Toronto for the years 1993 to 2015 are presented in Table 4.6. The table shows that residential waste generation in Metro is estimated to increase from 1,105,878 tonnes in 1993 to 1,249,358 tonnes in the year 2015.

Table 4.4
Region of Durham
Waste Generation Estimate
1993 to 2015

Year	Population (1)	Residential Waste (Tonnes) (2)	Number of Employees (3)	Industrial & Commercial Waste (Tonnes) (4)	Total Generation (Tonnes) (5)	Total Generation (Tonnes) (6)
1993	433,307	142,991	172,277	196,396	339,387	337,979
1994	445,959	147,166	178,765	203,792	350,959	347,848
1995	458,980	151,463	185,497	211,467	362,930	358,004
1996	472,382	155,886	192,482	219,429	375,316	368,458
1997	486,175	160,438	199,730	227,692	388,130	379,217
1998	500,370	165,122	207,252	236,267	401,389	390,289
1999	514,980	169,943	215,056	245,164	415,107	401,684
2000	530,017	174,906	223,155	254,397	429,302	413,413
2001	545,493	180,013	231,558	263,976	443,989	425,485
2002	561,420	185,269	240,278	273,917	459,186	437,908
2003	577,813	190,678	249,326	284,232	474,910	450,694
2004	594,684	196,246	258,716	294,936	491,182	463,854
2005	612,048	201,976	268,458	306,042	508,018	477,397
2006	629,919	207,873	278,568	317,568	525,441	491,337
2007	648,312	213,943	289,058	329,526	543,469	505,683
2008	667,241	220,190	299,943	341,935	562,125	520,448
2009	686,724	226,619	311,238	354,811	581,430	535,645
2010	706,775	233,236	322,959	368,173	601,409	551,285
2011	727,412	240,046	335,120	382,037	622,083	567,381
2012	748,651	247,055	347,740	396,424	643,478	583,948
2013	770,511	254,269	360,835	411,352	665,621	600,999
2014	793,009	261,693	374,424	426,843	688,536	618,547
2015	816,163	269,334	388,523	442,916	712,250	636,607

Notes:
(1) Population data from Durham Regonal Official Plan (Report 93-P-128), Social Environment Technical Appendix, 1994.
(2) Population projection multiplied by 0.33 tonnes/capita/year (based on historical data)
(3) Employment data: Social Environment Technical Appendix, 1994
(4) Number of employees (col. 3) multiplied by 1.14 tonnes/employee/year (based on 1987 data)
(5) Column 2 plus Column 4
(6) Population (Col. 1) multiplied by 0.78 tonnes/cap/yr (1987 Total Gen. Rate divided by population)

Table 4.5
Metropolitan Toronto
Residential Waste Management History

Year	Population	Residential Generation (Tonnes)	Residential Generation Rate (T/Cap/Yr)	Residential Diversion Rate %	RESIDENTIAL DIVERSION (Tonnes)						WASTE LANDFILLED		
					Total Residential Diversion	Green Waste	Backyard Compost	Blue Box	Igloo & Container	Other	Residential (Tonnes)	ICI (Tonnes)	Total (Tonnes)
1986	2,175,900	1,007,243	0.46	0.00	0						1,007,243	1,445,857	2,453,100
1987	2,125,520	1,021,576	0.48	2.11	21,554	4,639		16,915			1,000,022	1,490,098	2,490,120
1988	2,133,559	1,028,254	0.48	3.85	39,592	13,537		26,055			988,662	1,405,066	2,393,728
1989	2,130,855	1,060,206	0.50	8.00	84,821	22,241		62,580			975,385	1,241,573	2,216,958
1990	2,137,204	1,053,120	0.49	10.42	109,688	27,082	7,028	75,065		513	943,432	1,169,697	2,113,129
1991	2,275,771	1,010,488	0.44	15.99	161,565	56,445	11,731	85,054		8,335	848,923	704,492	1,553,415
1992	2,289,798	1,069,790	0.47	18.81	201,177	71,062	17,745	99,671	2,611	10,088	868,613	200,015	1,068,628
		Average =	*0.48*										

Notes:

1) Population data: Social Environment Technical Appendix, 1994.
2) Green waste includes leaves, yard waste & Xmas trees
3) Residential waste is "Municipal waste" which includes residential, light commercial collected by municipal forces, street sweepings, catch basin cleanings, Parks Dept. wastes
4) 1991 landfill total revised to include Symes transfer station, contaminated soil and sewage sludge quantities
5) Information supplemented with Metropolitan Toronto Works Department Capital Works Program, 1994-1998, approved January 26, 1994.

Table 4.6
Metropolitan Toronto
Waste Generation Estimate
1993 to 2015

Year	Population (1)	Residential Waste (Tonnes) (2)	Number of Employees (3)	Industrial & Commercial Waste (Tonnes) (4)	Total Generation (Tonnes) (5)	Total Generation (Tonnes) (6)
1993	2,303,912	1,105,878	1,389,440	1,528,384	2,634,262	2,718,616
1994	2,318,113	1,112,694	1,399,264	1,539,190	2,651,885	2,735,373
1995	2,332,401	1,119,552	1,409,157	1,550,073	2,669,625	2,752,233
1996	2,346,778	1,126,453	1,419,119	1,561,031	2,687,484	2,769,198
1997	2,361,243	1,133,397	1,429,153	1,572,068	2,705,465	2,786,267
1998	2,375,797	1,140,383	1,439,257	1,583,183	2,723,565	2,803,440
1999	2,390,441	1,147,412	1,449,432	1,594,375	2,741,787	2,820,720
2000	2,405,175	1,154,484	1,459,680	1,605,648	2,760,132	2,838,107
2001	2,420,000	1,161,600	1,470,000	1,617,000	2,778,600	2,855,600
2002	2,431,741	1,167,236	1,482,510	1,630,761	2,797,997	2,869,454
2003	2,443,538	1,172,898	1,495,126	1,644,639	2,817,537	2,883,375
2004	2,455,393	1,178,589	1,507,850	1,658,635	2,837,224	2,897,364
2005	2,467,305	1,184,306	1,520,682	1,672,750	2,857,057	2,911,420
2006	2,479,274	1,190,052	1,533,623	1,686,985	2,877,037	2,925,543
2007	2,491,302	1,195,825	1,546,674	1,701,341	2,897,166	2,939,736
2008	2,503,389	1,201,627	1,559,837	1,715,821	2,917,447	2,953,999
2009	2,515,534	1,207,456	1,573,111	1,730,422	2,937,878	2,968,330
2010	2,527,737	1,213,314	1,586,498	1,745,148	2,958,462	2,982,730
2011	2,540,000	1,219,200	1,600,000	1,760,000	2,979,200	2,997,200
2012	2,555,564	1,226,671	1,609,729	1,770,702	2,997,373	3,015,566
2013	2,571,223	1,234,187	1,619,518	1,781,470	3,015,657	3,034,043
2014	2,586,978	1,241,749	1,629,366	1,792,303	3,034,052	3,052,634
2015	2,602,830	1,249,358	1,639,274	1,803,201	3,052,560	3,071,339

Notes:
(1) Population data prepared by Hemson Consulting Ltd., Social Environment Technical Appendix, 1994.
(2) Population projection multiplied by 0.48 tonnes/capita/year (based on historical data)
(3) Employment data: Social Environment Technical Appendix, 1994.
(4) Number of employees (col. 3) multiplied by 1.1 tonnes/employee/year (based on 1987 data)
(5) Column 2 plus Column 4
(6) Population (Col. 1) multiplied by 1.18 tonnes/cap/yr (1987 Total Gen. Rate divided by population)

4.2.5 Residential Waste Generation Estimates for Region of York

Region of York Waste Disposal Data

The majority of Region of York's solid waste is disposed in Metro Toronto's Keele Valley landfill. The disposal needs of some of the smaller communities in the northern part of the Region are served by landfills in Georgina and King Townships. The Study Team obtained data for waste generated in Region of York and disposed at the Keele Valley landfill for the years 1988 through 1992 from Metro Toronto staff. The 1986 and 1987 landfill data were taken from the IWA DAC for Metro Toronto and Region of York (Interim Waste Authority Ltd., 1991). Estimates of the quantities disposed at the smaller landfills were provided to the Study Team by Region of York staff (Flewelling, Region of York, 1993).

The allocation of waste to residential and IC&I sources was provided by Metro Toronto staff for 1988 through 1992 (Scanga, Metro Works, 1993). The residential quantities for 1986 and 1987 were estimated based on the residential waste percentage reported in the Waste Management Study for the Region of York (MacLaren Engineers, 1989). The same residential percentage of the total disposed stream was applied to the estimated quantities being disposed at the Georgina and King landfills. Historical waste disposal data for Region of York for the years 1986 through 1992 are presented in Table 4.7.

Residential Waste Quantity Projections

Waste diversion in Region of York is carried out at the municipal level, and there is very little diversion information available at the Regional level. Each municipality was contacted by the Study Team in February and March, 1993 to obtain current and historical waste diversion data.

Available information on the residential waste diverted was added to the residential waste quantities sent to landfill to estimate the total residential waste generated. The estimated residential waste generated each year was divided by the population in that year to estimate the residential waste generation rate (in t/c/y). Based on the available data, the estimated residential waste generation rate fluctuated considerably from year to year. The estimated generation rate (in t/c/y) was 0.29 for 1986, 0.41 for 1987, 0.38 for 1988, 0.32 for 1989, 0.38 for 1990, 0.35 for 1991, and 0.37 for 1992. The rate for 1986 was considered an outlier and was not used in developing residential waste generation projections. An average rate of 0.37 t/c/y was calculated (excluding 1986), and was used for the residential waste quantity projections.

Residential waste generation for future years was estimated by applying the average residential waste generation rate of 0.37 t/c/y to future population projections. This calculation has assumed that residential waste generation rates will remain constant (on a per capita basis) until the year 2015. In Regional projections presented in Chapter 15 of this Appendix, the effects of potential source reduction measures on net residential waste generation are taken into account.

Residential waste generation projections for the Region of York for the years 1993 to 2015 are presented in Table 4.8. The table shows that residential waste generation in the Region is estimated to increase from 201,409 tonnes in 1993 to 368,950 tonnes in the year 2015.

4.2.6 Residential Waste Generation Estimates for Region of Peel

Region of Peel Waste Disposal Data

The Regional Municipality of Peel's waste is disposed primarily in the Britannia landfill site, with small quantities of waste going to the Caledon and Albion landfill sites. Landfill disposal quantities were supplied by Peel Regional staff for 1987 through 1992. The 1986 landfill

Table 4.7
Region of York
Residential Waste Management History

Year	Region of York Population	Residential Generation (Tonnes)	Residential Generation Rate (T/Cap/Yr)	Residential Diversion Rate %	RESIDENTIAL DIVERSION (Tonnes): Total Residential Diversion	Green Waste	Backyard Compost	Blue Box	Igloo & Container	Other	Total ICI	WASTE LANDFILLED: Residential (Tonnes)	ICI (Tonnes)	Total (Tonnes)
1986	350,602	103,350	0.29									103,350	221,650	325,000
1987	386,103	158,295	0.41									158,295	339,487	497,782
1988	409,292	157,013	0.38	3.18	5,000			5,000				152,013	336,712	488,725
1989	442,022	140,711	0.32	5.22	7,352	752		6,600				133,359	377,296	510,655
1990	466,791	179,558	0.38	17.91	32,158	8,100		24,058				147,400	303,689	451,089
1991	504,981	174,532	0.35	21.11	36,839	9,400		27,439				137,693	161,643	299,336
1992	524,296	196,250	0.37	27.57	54,101	16,300	4,909	25,433		7,458		142,150	26,434	168,583
		Average =	*0.37* (excl. 1986)											

Notes:

1) Population and employment data: Social Environment Technical Appendix, 1994.
2) 25000 tonnes added to total waste landfilled for the Township of King and Georgina Landfills for 1986-1991; 15000 tonnes added for 1992. (Flewelling, Region of York 1993)
3) 1990 - 1991 Blue Box quantities supplied by OMMRI (Boland, OMMRI, 1993)
4) 1992 Blue Box quantities: supplied by Markham, Richmond Hill, and Region of York
5) 1988 and 1989 Blue Box quantities for Markham only
6) 1988 Residential landfill quantity from Table 2-1, (MacLaren Engineers 1989)
7) 1988 Residential landfill percentage applied to 1986 and 1987 to calculate quantity going to landfill (31.8%)

Table 4.8
Region of York
Waste Generation Estimate
1993 to 2015

Year	Population (1)	Residential Waste (Tonnes) (2)	Number of Employees (3)	IC&I Waste (Tonnes) (4)	Total Generation (Tonnes) (5)	Total Generation (Tonnes) (6)
1993	544,349	201,409	269,509	428,519	629,928	604,227
1994	565,170	209,113	279,827	444,925	654,038	627,339
1995	586,786	217,111	290,540	461,959	679,069	651,332
1996	609,230	225,415	301,664	479,646	705,061	676,245
1997	632,532	234,037	313,213	498,009	732,046	702,111
1998	656,725	242,988	325,205	517,076	760,064	728,965
1999	681,844	252,282	337,656	536,873	789,155	756,847
2000	707,923	261,932	350,583	557,427	819,358	785,795
2001	735,000	271,950	364,005	578,768	850,718	815,850
2002	752,824	278,545	377,941	600,926	879,471	835,635
2003	771,080	285,300	392,411	623,933	909,233	855,899
2004	789,778	292,218	407,435	647,822	940,040	876,654
2005	808,931	299,304	423,034	672,624	971,929	897,913
2006	828,547	306,562	439,230	698,376	1,004,938	919,687
2007	848,639	313,996	456,046	725,113	1,039,110	941,989
2008	869,219	321,611	473,506	752,875	1,074,486	964,833
2009	890,297	329,410	491,634	781,698	1,111,108	988,230
2010	911,887	337,398	510,457	811,627	1,149,025	1,012,195
2011	934,000	345,580	530,000	842,700	1,188,280	1,036,740
2012	949,405	351,280	538,811	856,709	1,207,989	1,053,840
2013	965,064	357,074	547,768	870,951	1,228,025	1,071,221
2014	980,981	362,963	556,874	885,430	1,248,393	1,088,889
2015	997,161	368,950	566,132	900,150	1,269,099	1,106,849

Notes:
(1) Population data: Social Environment Technical appendix, 1994.
(2) Population projection multiplied by 0.37 tonnes/capita/yr (average rate based on historical data)
(3) Employment data: Social Environment Technical Appendix, 1994.
(4) Number of employees (col. 3) multiplied by 1.59 tonnes/employee/year ('86 & '87 average rate)
(5) Column 2 plus Column 4
(6) Population (Column 1) multiplied by 1.11 tonnes/cap/year
('86 & '87 Avg. Total Gen. Rate divided by population)

disposal data were taken from the IWA DAC for the Region of Peel (Interim Waste Authority Ltd., 1991).

The allocation of waste to residential and IC&I sources was provided by Region of Peel staff. The historical data for 1986 through 1992 are presented in Table 4.9.

Residential Waste Quantity Projections

Quantities of residential waste diverted from landfill were reported by Region of Peel staff (Morgan-Fraser, Region of Peel, 1993). The residential waste diverted was added to the residential waste quantities sent to landfill to estimate the total residential waste generated. The residential waste generated was divided by the population to give the residential generation rate (in t/c/y). The rate was relatively constant between 1987 and 1992. The generation rate was 0.40 t/c/y for 1987 and 1988, 0.44 for 1989, 0.43 for 1990, 0.40 for 1991, and 0.41 for 1992. The 1986 generation rate was assumed to be the same as the 1987 rate (0.40). An average value of 0.41 t/c/y (excluding 1986) was used for the residential waste quantity projections.

Residential waste generation for future years was estimated by applying the average residential waste generation rate of 0.41 t/c/y to future population projections. This calculation has assumed that residential waste generation rates will remain constant (on a per capita basis) until the year 2015. In regional projections presented in Chapter 15 of this Appendix, the effects of potential source reduction measures on net residential waste generation are taken into account.

Residential waste generation estimates for the Region of Peel for the years 1993 to 2015 are presented in Table 4.10. The table shows that residential waste generation in the Region is estimated to increase from 319,079 tonnes in 1993 to 489,047 tonnes in the year 2015.

4.2.7 Residential Waste Generation Estimates for Region of Halton

Region of Halton Waste Disposal Data

The Regional Municipality of Halton's waste is disposed at the Halton Waste Management site in Milton. This site opened in November, 1992. Prior to this, Halton's waste was taken to the Norjohn transfer station in Burlington for export from the region. Roughly half of this waste was taken to Buffalo for disposal at Occidental, and the remainder was taken to Walker Brothers in Thorold (Torrence, Region of Halton, 1993). Landfill disposal quantities were supplied to the Study Team by Halton Regional staff for 1990 through 1992. MOEE staff provided additional data for years prior to 1990 (MOEE, 1993).

The allocation of waste to residential and IC&I sources was provided by Region of Halton and MOEE staff. The historical data for 1987 through 1992 are presented in Table 4.11.

Halton Residential Waste Quantity Projections

Quantities of residential waste diverted in the years 1990 through 1992 were reported to the Study Team by Halton Regional staff. The residential waste diverted was added to the residential waste quantities sent to landfill to estimate the total residential waste generated. The residential waste generated was divided by the population to give the residential generation rate (in t/c/y). The rate was relatively constant between 1990 and 1992. The generation rate was 0.39 t/c/y in 1990 and 1991, and 0.42 t/c/y for 1992. An average value of 0.40 t/c/y was used for the residential waste quantity projections.

Table 4.9
Region of Peel
Residential Waste Management History

Year	Population	Residential Generation (Tonnes)	Residential Generation Rate (T/Cap/Yr)	Residential Diversion Rate %	Total Residential Diversion	RESIDENTIAL DIVERSION (Tonnes) Green Waste	Backyard Compost	Blue Box	Igloo & Container	Other	WASTE LANDFILLED Residential (Tonnes)	ICI (Tonnes)	Total (Tonnes)
1986	592,170	*242,790*	*0.40*										**716,385**
1987	636,475	252,391	0.40								252,391	449,360	701,751
1988	667,445	264,103	0.40								264,103	478,926	743,030
1989	702,450	307,922	0.44	9.86	**30,351**		1,800		200		277,571	470,449	748,021
1990	724,530	311,320	0.43	12.40	38,599	3,639	3,730	30,497	250	483	272,721	361,513	634,234
1991	732,798	289,589	0.40	15.11	43,761	4,611	6,741	30,469	540	1,400	245,828	224,086	469,914
1992	755,178	313,296	0.41	19.14	59,967	7,661	9,606	34,867	5,793	2,040	253,329	44,203	297,532
		Average =	*0.41*										

Notes:

1) Population data: Social Environment Technical Appendix, 1994.
2) 1991 and 1992 Green Waste totals include compost from Mississauga wet/dry project.
3) 1989 Total Residential Diversion (tonnes) from SENES Consultants, 1991
4) Disposal and diversion data supplied by Region of Peel (Morgan-Fraser, L., Region of Peel, 1993)

Table 4.10
Region of Peel
Waste Generation Estimate
1993 to 2015

Year	Population (1)	Residential Waste (Tonnes) (2)	Number of Employees (3)	Industrial & Commercial Waste (Tonnes) (4)	Total Generation (Tonnes) (5)	Total Generation (Tonnes) (6)
1993	778,242	319,079	400,956	565,348	884,427	856,066
1994	802,010	328,824	411,863	580,727	909,551	882,211
1995	826,504	338,867	423,067	596,524	935,391	909,154
1996	851,745	349,215	434,576	612,752	961,968	936,920
1997	877,758	359,881	446,398	629,421	989,302	965,534
1998	904,565	370,872	458,542	646,544	1,017,416	995,022
1999	932,191	382,198	471,016	664,133	1,046,331	1,025,410
2000	960,661	393,871	483,829	682,199	1,076,070	1,056,727
2001	990,000	405,900	496,991	700,757	1,106,657	1,089,000
2002	1,004,943	412,027	510,510	719,819	1,131,846	1,105,437
2003	1,020,112	418,246	524,398	739,401	1,157,647	1,122,123
2004	1,035,510	424,559	538,664	759,516	1,184,075	1,139,061
2005	1,051,140	430,967	553,317	780,177	1,211,144	1,156,254
2006	1,067,005	437,472	568,369	801,400	1,238,872	1,173,706
2007	1,083,111	444,076	583,831	823,202	1,267,277	1,191,422
2008	1,099,459	450,778	599,713	845,595	1,296,374	1,209,405
2009	1,116,055	457,583	616,028	868,599	1,326,182	1,227,661
2010	1,132,900	464,489	632,786	892,228	1,356,717	1,246,190
2011	1,150,000	471,500	650,000	916,500	1,388,000	1,265,000
2012	1,160,554	475,827	657,136	926,562	1,402,389	1,276,609
2013	1,171,204	480,194	664,352	936,736	1,416,930	1,288,324
2014	1,181,952	484,600	671,646	947,021	1,431,621	1,300,147
2015	1,192,798	489,047	679,021	957,420	1,446,467	1,312,078

Notes:

(1) Population data: Social Environment Technical Appendix,1994.
(2) Population projection multiplied by 0.41 tonnes/capita/year (based on historical data)
(3) Employment data: Social Environment Technical Appendix,1994.
(4) Number of employees (col. 3) multiplied by 1.41 tonnes/employee/year (based on 1987 data)
(5) Column 2 plus Column 4
(6) Population (Col.1) multiplied by 1.1 tonnes/cap/year (1987 Total Gen. Rate divided by population)

Table 4.11
Region of Halton
Residential Waste Management History

Year	Population	Residential Generation (Tonnes)	Residential Generation Rate (T/Cap/Yr)	Residential Diversion Rate %	RESIDENTIAL DIVERSION (Tonnes): Total Residential Diversion	Green Waste	Backyard Compost	Blue Box	Igloo & Container	Other	WASTE LANDFILLED: Residential (Tonnes)	ICI (Tonnes)	Total (Tonnes)
1986	271,389												
1987	275,945										101,600	109,100	272,900
1988	284,994										103,400	111,100	294,100
1989	291,600					1,812					96,700	93,300	190,000
1990	297,650	115,151	0.39	20.97	24,151	3,747		20,404			91,000	101,000	192,000
1991	313,136	123,014	0.39	30.33	37,314	8,140		25,934	3,240		85,700	70,000	155,700
1992	322,467	135,193	0.42	34.32	46,393	15,000	4,343	23,450	3,600		88,800	13,800	102,600
		Average =	*0.40*										

Notes:

1) Population data: Social Environment Technical Appendix, 1994.
2) Data for 1990-1992 supplied by Region of Halton Staff
3) Data for 1987-1989 supplied by MOEE staff

Residential waste generation in future years was estimated by applying the average residential generation rate of 0.40 t/c/y to future population projections. This calculation has assumed that residential waste generation rates will remain constant (on a per capita basis) until the year 2015.

Residential waste generation estimates for the Region of Halton for the years 1993 to 2015 are presented in Table 4.12. The table shows that residential waste generation in the Region is estimated to increase from 132,830 tonnes in 1993 to 230,034 tonnes in the year 2015.

4.3 Method Used to Develop Residential Waste Composition Estimates

A number of residential waste composition studies have been carried out in Southern Ontario municipalities in the past five years. These include studies in East York (Gore and Storrie Ltd., 1991), Ottawa-Carleton (R.W. Beck and Associates, 1992), Quinte (Quinte Regional Recycling 1992), Kingston (Gore and Storrie Ltd., 1992) and Guelph (City of Guelph, 1991).

The results of each study were analysed to identify the most appropriate data to use for the GTA 3Rs analysis. Each residential waste composition study used a slightly different set of waste stream material descriptions. In addition, some studies reported the composition of the combined waste stream (before some materials were removed for recycling), and others reported the composition after recycling. Some of the studies contained yard waste quantities, but the studies conducted in East York and Kingston did not.

In order to rationalize the data, one material description breakdown was chosen. The data from each study were modified to fit into this material description. Per capita generation rates were estimated for each material in the residential waste stream for which data were provided. Per capita rates for wastes not included in the waste composition studies (such as yard waste and white goods) were then developed, based on an earlier study (CH2M Hill Engineering Ltd., 1991). The separate generation rates were added together to estimate a total waste generation rate. This information was then used to estimate waste composition, expressed as a % of the total waste stream, occupied by each material. Table 4.13 presents the results of these studies, modified as described above. The "Other" category includes items that could not be placed in any of the more specific categories (e.g. household hazardous waste, miscellaneous items collected at depots, etc.).

Results from the various studies were reasonably consistent, with some exceptions (such as newspaper). Observations are as follows:

- the percentage of newspaper ranged from 5% in Ottawa, to 16.5% in East York. On average, paper (total) comprised approximately one third of the total waste stream, with the exception of Quinte, where paper (total) was 20.8%;
- glass ranged from 2.5% in Ottawa to 6.7% in the Township of Kingston;
- ferrous metals ranged from 3.3% in East York to 5% in Ottawa;
- non-ferrous metals ranged from 0.5% in the Township of Kingston to 1% in East York. (Non-ferrous metals were not broken out in the Guelph study);
- plastics ranged from 4.5% in Quinte to 8.2% in Ottawa and City of Kingston;
- food wastes ranged from 11.4% in Ottawa to 23.9% in the City of Kingston;

Table 4.12
Region of Halton
Waste Generation Estimates
1993 to 2015

Year	Population (1)	Residential Waste (Tonnes) (2)	Number of Employees (3)	Industrial & Commercial Waste (Tonnes) (4)	Total Generation (Tonnes) (5)	Total Generation (Tonnes) (6)
1993	332,075	132,830	150,576	134,013	266,843	242,415
1994	341,970	136,788	156,160	138,982	275,770	249,638
1995	352,160	140,864	161,951	144,136	285,000	257,077
1996	362,653	145,061	167,956	149,481	294,542	264,737
1997	373,459	149,384	174,185	155,025	304,408	272,625
1998	384,587	153,835	180,644	160,773	314,608	280,749
1999	396,046	158,418	187,343	166,735	325,154	289,114
2000	407,847	163,139	194,290	172,918	336,057	297,728
2001	420,000	168,000	201,495	179,331	347,331	306,600
2002	429,885	171,954	208,967	185,981	357,935	313,816
2003	440,002	176,001	216,716	192,877	368,878	321,201
2004	450,357	180,143	224,752	200,029	380,172	328,761
2005	460,957	184,383	233,087	207,447	391,830	336,499
2006	471,805	188,722	241,730	215,140	403,862	344,418
2007	482,909	193,164	250,694	223,118	416,281	352,524
2008	494,274	197,710	259,991	231,392	429,102	360,820
2009	505,907	202,363	269,632	239,972	442,335	369,312
2010	517,814	207,126	279,631	248,872	455,997	378,004
2011	530,000	212,000	290,000	258,100	470,100	386,900
2012	540,929	216,372	295,506	263,000	479,372	394,878
2013	552,082	220,833	301,115	267,992	488,825	403,020
2014	563,466	225,386	306,831	273,080	498,466	411,330
2015	575,084	230,034	312,656	278,264	508,297	419,811

Notes:
(1) Population data: Social Environment Technical Appendix, 1994.
(2) Population projection multiplied by 0.40 tonnes/capita/year (based on historical data)
(3) Employment data: Social Environment Technical Appendix, 1994.
(4) Number of employees (col. 3) multiplied by 0.89 tonnes/employee/year (based on 1987 data)
(5) Column 2 plus Column 4
(6) Population (Col. 1) multiplied by 0.73 tonnes/cap/yr (1990 Total Gen. Rate divided by population)

Table 4.13

Comparison Results from Southern Ontario Residential Waste Composition Studies

Component	East York (1) % composition Combined waste	Ottawa (2) % composition Combined waste	Quinte (3) % composition Combined waste	Twnshp of Kingston (4) % composition Combined waste	City of Kingston (4) % composition Combined waste	Kingston-Twn.&City % composition Combined waste	Guelph (5) % composition Combined waste	GTA (6) % composition Combined waste
Paper								
Newspaper	16.51	5.00	9.96	10.54	9.37	9.82	12.24	16.51
Fine paper	1.41	0.70		1.94	1.28	1.54	1.59	1.41
Boxboard	3.51	3.40	3.46	3.47	4.26	3.95	2.53	3.51
Corrugated cardboard (OCC)	2.55	5.50	2.32	1.26	1.92	1.67	2.27	2.55
Magazines/Flyers	4.04	1.90	0.90	3.06	2.30	2.60	4.41	4.04
Mixed paper	6.50	4.30	2.90	9.90	10.05	9.99	3.01	6.50
Telephone books			0.23					
Composite packaging			0.88					
Other		8.90	0.10					
Subtotal (for category)	**34.51**	**29.70**	**20.75**	**30.17**	**29.18**	**29.56**	**26.05**	**34.51**
Glass								
Food and beverage containers	3.95	1.90	5.25	5.99	5.67	5.79		3.95
Other	0.97	0.60	0.56	0.71	0.57	0.64		0.97
Subtotal (for category)	**4.92**	**2.50**	**5.81**	**6.71**	**6.24**	**6.42**	**6.19**	**4.92**
Tinplate Steel (ferrous)								
Food and beverage containers	1.84	1.70	3.27	2.96	2.71	2.80		1.84
White goods								
Other	1.41	3.30	1.00	1.00	0.96	0.98		1.41
Subtotal (for category)	**3.25**	**5.00**	**4.27**	**3.96**	**3.67**	**3.78**	**3.73**	**3.25**
Aluminum (non-ferrous)								
Food and beverage containers	0.53	0.30	0.31	0.30	0.35	0.33		0.53
Foil (rigid and flexible)	0.26		0.17	0.13	0.20	0.18		0.26
Other	0.18	0.50	0.20	0.10	0.10	0.11		0.18
Subtotal (for category)	**0.97**	**0.80**	**0.68**	**0.53**	**0.65**	**0.61**	**0.00**	**0.97**
Plastic								
PET	0.09	0.30	0.42	0.27	0.21	0.24	0.12	0.20
HDPE	4.39	0.50	0.60	6.17	6.40	6.31		0.34
Other Rigid	0.26		0.66	0.41	0.44	0.43	1.04	0.69
Film	0.26	3.10	2.42	0.36	0.27	0.31	1.98	2.12
Polystyrene	0.62	0.40	0.39	0.70	0.87	0.80	0.22	0.28
Other		3.90					1.15	1.99
Subtotal (for category)	**5.62**	**8.20**	**4.49**	**7.91**	**8.19**	**8.09**	**4.51**	**5.62**

Table 4.13

Comparison Results from Southern Ontario Residential Waste Composition Studies

Component	East York (1) % composition Combined waste	Ottawa (2) % composition Combined waste	Quinte (3) % composition Combined waste	Twnshp of Kingston (4) % composition Combined waste	City of Kingston (4) % composition Combined waste	Kingston-Twn.&City % composition Combined waste	Guelph (5) % composition Combined waste	GTA (6) % composition Combined waste
Organics								
Food wastes	22.13	11.40	17.80	22.90	23.93	23.51	22.20	22.13
Yard waste (leaves,grass,weeds	12.27	14.70	30.40	12.82	11.76	12.17	22.39	12.27
Yard waste (other)	4.13	0.20	3.60	4.27	3.92	4.06		4.13
Other Organics		8.20					1.78	
Subtotal (for category)	38.53	34.50	51.80	39.99	39.60	39.74	46.37	38.53
Wood Waste	0.79	4.10		0.85	1.04	0.96	1.15	0.79
Const./Demolition Waste	1.49	1.90		0.61	1.05	0.88		1.49
Drywall								
Subtotal (for category)	1.49	1.90	0.00	0.61	1.05	0.88	0.00	1.49
Disposable Diapers	2.63	2.90	2.30	2.06	2.89	2.57	2.02	2.63
Textiles/Leather/Rubber	4.04	3.60	2.46	4.43	3.85	4.08	1.99	4.04
Used Tires		1.00						
Household Hazardous Waste	0.35	0.30	0.40	0.36	0.15	0.23	0.30	0.35
Other	2.90	5.50	6.70	2.44	3.49	3.07	7.68	2.90
TOTAL	100.00	100.00	99.66	100.00	100.00	100.00	99.99	100.00

(1) (Gore and Storrie Ltd., 1991)
(2) (R.W. Beck and Associates, 1992)
(3) (Quinte Regional Recycling, 1992)
(4) (Gore and Storrie, 1992)
(5) (City of Guelph, 1991)
(6) East York composition (1) with modified plastics (2) for application to GTA
Yard Waste for East York and Kinston taken from CH2M Hill Engineering Ltd. 1991

- yard waste quantities were estimated to be 16.4% for East York (CH2M Hill, 1991) and 16.2% for Kingston (Township & City). Values ranged from 14.9% in Ottawa to a reported rate of 34% in Quinte. (The latter set of data was collected during a period of high yard waste generation, and was ignored for this study);

- wood waste ranged from 0.8% in East York to 4.1% in Ottawa. No value was given for Quinte;

- construction and demolition waste ranged from 0.6% in Kingston (Township) to 1.9% in Ottawa. There were no values given for Quinte or Guelph;

- disposable diapers ranged from 2.0% in Guelph, to 2.9% in Ottawa and Kingston (City);

- textiles/leather/rubber ranged from 2% in Guelph to 4.4% in Kingston (Township). Used tires may have been included in some studies, but the quantities were not broken out. The only study listing a separate value for used tires was Ottawa (1%);

- household hazardous waste ranged from 0.2% in Kingston (City) to 0.4% in Quinte;

- all other waste types were grouped under the category "Other". These quantities ranged from 2.4% in Kingston (Township) to 7.7% in Guelph.

The East York residential waste composition was chosen as being the most representative for the GTA because East York is located within the GTA, and the study was carried out relatively recently (1989). Therefore, the East York information (modified as required, to include additional waste categories not measured during the composition study) was used for residential waste composition estimates presented in the following sections. Note that the East York plastics composition was modified using a more detailed plastics composition breakdown from a study by R.W. Beck et al (1992) conducted in the Region of Ottawa-Carleton. As Table 4.13 shows, the East York waste composition data agree favourably with data from the other studies for all major waste categories.

The following sections use these data to estimate the composition of residential waste generated by each regional municipality in the GTA in 1992. Available waste diversion data by material are subtracted to estimate residential waste disposed by each GTA Region in 1992.

Residential waste generators were divided into two distinct groups:

- single-family households, which include semi-detached townhouses and duplexes who were assumed to generate yard waste; and
- multi-family households, which include high-rise and low-rise units, who were assumed to generate no yard waste.

The proportion of single-family and multi-family households in each Region was provided to RIS by Hardy Stevenson and Associates. A summary of the number of single-family and multi-family households in each Region is presented in section 5.3, Table 5.1.

For each Region, an effort was made to allocate total residential waste generation tonnages to these two groups of residential generator. This was necessary for diversion estimates as the options and recovery rates are different for multi-family and single-family households. The allocation of total residential waste to single-family and multi-family residents was carried out

by assuming that single-family residents generate 17% per capita more than multi-family residents. The basis of this assumption is that single family households generate significant quantities of yard waste (approximately 17% of their total) and that multi-family households generate similar quantities of various waste materials per capita as single family residents, but do not generate any yard waste. The allocation was carried out using the number of single-family and multi-family households in each Region.

The number of single-family and multi-family households in each Region was then used to allocate total residential waste generation to these two groups. Subtle differences in the composition of single versus multi-family waste related to lifestyle differences were not taken into account in this analysis. The residential waste composition estimates vary somewhat from one region to another, depending on the percentage of multi-family households in the Region.

4.4 Residential Waste Composition Estimate for Region of Durham

Table 4.14 presents estimates of the composition of residential waste generated, diverted and disposed in Region of Durham in 1992. The table shows approximately 140,078 tonnes of residential waste was generated in 1992. It was estimated that 122,346 tonnes of this total were generated by single-family households, and 17,732 tonnes were generated by multi-family households. An estimated 36,987 tonnes of residential waste were diverted, and 103,091 tonnes were disposed.

The residential waste generated is estimated to have had the following composition:

- 17% newspaper;
- 18.4% other paper;
- 5.0% glass;
- 3.7% tinplate steel;
- 1% aluminum;
- 5.7% plastic;
- 22.6% food;
- 14% yard waste;
- 2.7% disposable diapers;
- 9.8% other materials.

Based on the available data, the disposed residential waste stream is estimated to have had the following composition:

- 11% newspapers;
- 23% other papers;
- 3% glass;
- 3% metal;
- 8% plastic;
- 38% food and yard waste;
- 14% other materials.

This estimated composition of disposed residential waste from Region of Durham is presented in Figure 4.1.

4.5 Residential Waste Composition Estimate for Metropolitan Toronto

Table 4.15 presents estimates of the composition of residential waste generated, diverted and disposed in Metropolitan Toronto in 1992. The table shows that approximately 1,069,790 tonnes of residential waste were generated in 1992. Of this total, it is estimated that

Table 4.14
Region of Durham
Residential Waste Composition Estimates
1992

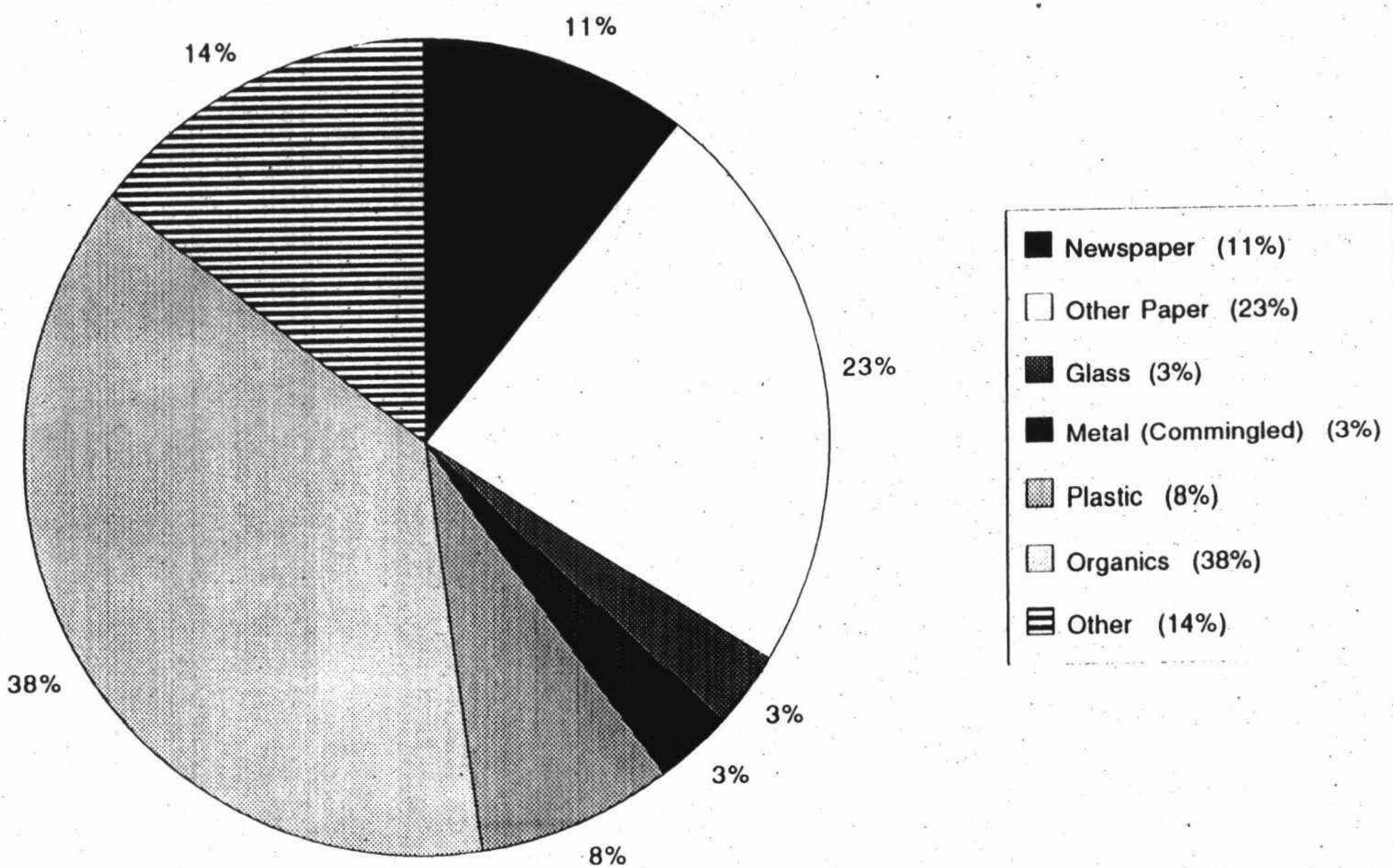
Component	Residential Waste Generated (Total) (tonnes)	Residential Waste Generated S-F Hhlds (tonnes)	Residential Waste Generated M-F Hhlds (tonnes)	Residential Diversion (tonnes)	Residential Waste Landfilled All Households	Comp. of Disposed Waste (%) All Hhlds
Total Residential Waste (tonnes)	140,078	122,346	17,732	36,987	103,091	
Paper						
Newspaper	23,612	20,111	3,502	12,531	11,081	11
Corrugated cardboard (OCC)	3,642	3,102	540	1,446	2,196	2
Telephone Directories	319	272	47	115	204	0
Mixed paper	21,786	18,555	3,231		21,786	21
Subtotal (Paper)	49,360	42,040	7,320	14,092	35,268	34
Glass	7,034	5,990	1,043	4,319	2,715	3
Tinplate Steel (ferrous)	5,175	4,486	689			
Aluminum (non-ferrous)	1,382	1,177	205			
Subtotal Metal (commingled)	6,556	5,662	894	3,177	3,379	3
Plastic						
PET	289	246	43	109	180	0
HDPE	490	418	73		490	0
Other Plastic	7,259	6,182	1,076		7,259	7
Subtotal (Plastic)	8,038	6,846	1,192	109	7,929	8
Organics						
Food wastes	31,651	26,957	4,694	2,580	29,071	28
Yard waste	19,981	19,981		9,259	10,722	10
Subtotal (Organics)	51,632	46,938	4,694	11,839	39,793	39
Wood Waste	1,130	963	168	621	509	0
Construction/Demolition Waste	2,135	1,819	317	752	1,383	1
Disposable Diapers	3,768	3,209	559		3,768	4
Textiles/Leather/Rubber	5,778	4,921	857	1,639	4,139	4
Other	4,647	3,958	689	439	4,208	4
Subtotal (Wood - Other)	17,458	14,869	2,589	3,451	14,007	14
TOTAL	140,078	122,346	17,732	36,987	103,091	100

Residential Diversion = 26%

Notes:

1) Composition estimates based on East York data from "Residential Waste Composition Study, Vol. I of the Ontario Waste Comp. Study", Gore & Storrie Ltd., Jan/91 (excl. yard waste).
2) Yard Waste (comp. generated) data from "The Physical and Economic Dimensions of Municipal Solid Waste in Ontario", CH2MHill Eng. Ltd., Nov/91
3) White Goods (comp. generated) estimate (included in Tinplate Steel total) from "Residential Waste Comp. Study, Vol. I of the Ontario Waste Comp. Study", G & S Ltd., 1990
4) Relative plastics composition based on Beck et al, 1992
5) Household data provided by Hardy Stevenson & Associates, 1994
6) Diversion data provided by Region of Durham Works Department, 1993.
7) Number of backyard composters provided by Region of Durham Staff, 1993.
8) Households: S-F - 97,269; Semi/Town/Row - 22,767; Low Rise - 9,521; M-F - 11,275. Note that Semi/Town/Row included with S-F; Low Rise included with M-F for this analysis.

Figure 4.1
Region of Durham
Composition of Disposed Residential Waste
1992



Note: Values shown on figure may not agree with text and Table due to rounding.

Table 4.15
Metropolitan Toronto
Residential Waste Composition Estimates, 1992

Component	Residential Waste Generated (tonnes) 1992	Residential Waste Generated S-F Hhlds	Residential Waste Generated M-F Hhlds	Residential Diversion (tonnes) 1992	Residential Waste Landfilled (by difference) 1992	Composition of Disposed Waste %
Total Residential Waste (tonnes)	1,069,790	594,768	475,022	201,177	868,613	
Paper						
Newspaper	191,573	97,766	93,807	57,995	133,578	15
Corrugated cardboard (OCC)	29,551	15,081	14,470	2,786	26,765	3
Telephone Directories	3,176	1,625	1,551	1,098	2,078	0
Mixed paper	176,168	89,900	86,268		176,168	20
Subtotal (Paper)	400,468	204,372	196,096	61,879	338,589	39
Glass	57,064	29,122	27,942	23,789	33,275	4
Tinplate Steel (ferrous)	40,268	21,806	18,462	18,314	21,954	3
Aluminum (non-ferrous)	11,209	5,720	5,489	387	10,822	1
Plastic						
PET	2,348	1,198	1,150	635	1,713	
HDPE	3,978	2,030	1,948	1,141	2,837	
Other Plastic	58,890	30,054	28,837		58,890	
Subtotal (Plastic)	65,216	33,282	31,934	1,776	63,440	7
Organics						
Food wastes	256,789	131,048	125,741	12,067	244,722	
Yard waste	97,134	97,134	0	76,740	20,394	
Subtotal (Organics)	353,923	228,182	125,741	88,807	265,116	31
Wood Waste	9,171	4,680	4,491		9,171	
Construction/Demolition Waste	17,323	8,841	8,483	1,500	15,823	
Disposable Diapers	30,570	15,601	14,969		30,570	
Textiles/Leather/Rubber	46,874	23,921	22,953		46,874	
Other	37,703	19,241	18,462	4,725	32,978	
Subtotal (Wood - Other)	141,641	72,284	69,357	6,225	135,416	16
TOTAL	1,069,790	594,768	475,022	201,177	868,613	100

Diversion = 19%

Notes:
1) Composition estimates based on East York data from "Residential Waste Composition Study, Vol. I of the Ontario Waste Comp. Study", Gore & Storrie Ltd., Jan/91 (excl. yard waste).
2) Yard Waste (comp. generated) data from "The Physical and Economic Dimensions of Municipal Solid Waste in Ontario", CH2MHill Eng. Ltd., Nov/91
3) White Goods (comp. generated) estimate (included in Tinplate Steel total) from "Residential Waste Comp. Study, Vol. I of the Ontario Waste Comp. Study", G & S Ltd., 1990
4) Relative plastics composition based on Beck et al, 1992
5) Household data provided by Hardy Stevenson & Associates, 1994
6) Diversion estimates from 1992 Metro Works Annual Report; personal communication with A. Nanda - Metro Works (June/93)
7) Number of backyard composters provided by Metro staff, 1993
8) Households: S-F - 289,330; Semi/Town/Row - 158,351; Low Rise - 112,057; M-F - 315,283. Note that Semi/Town/Row included with S-F, Low Rise included with M-F for this analysis.

approximately 594,768 tonnes were generated by single-family households, and an estimated 475,022 tonnes were generated by multi-family. An estimated 201,177 tonnes of residential waste were diverted, and 868,613 tonnes were disposed in 1992.

The residential waste generated in Metropolitan Toronto is estimated to have had the following composition:

- 17.9% newspaper;
- 19.5% other paper;
- 5.3% glass;
- 3.8% tinplate steel;
- 1% aluminum;
- 6% plastic;
- 24% food;
- 9.1% yard waste;
- 2.9% disposable diapers;
- 10.4% other materials.

Based on the available data, the disposed residential waste stream had the following composition:

- 15% newspapers;
- 23% other papers;
- 4% glass;
- 4% metal;
- 7% plastic;
- 31% food and yard waste;
- 16% other materials.

These waste composition data are presented in Figure 4.2.

4.6 Residential Waste Composition Estimate for Region of York

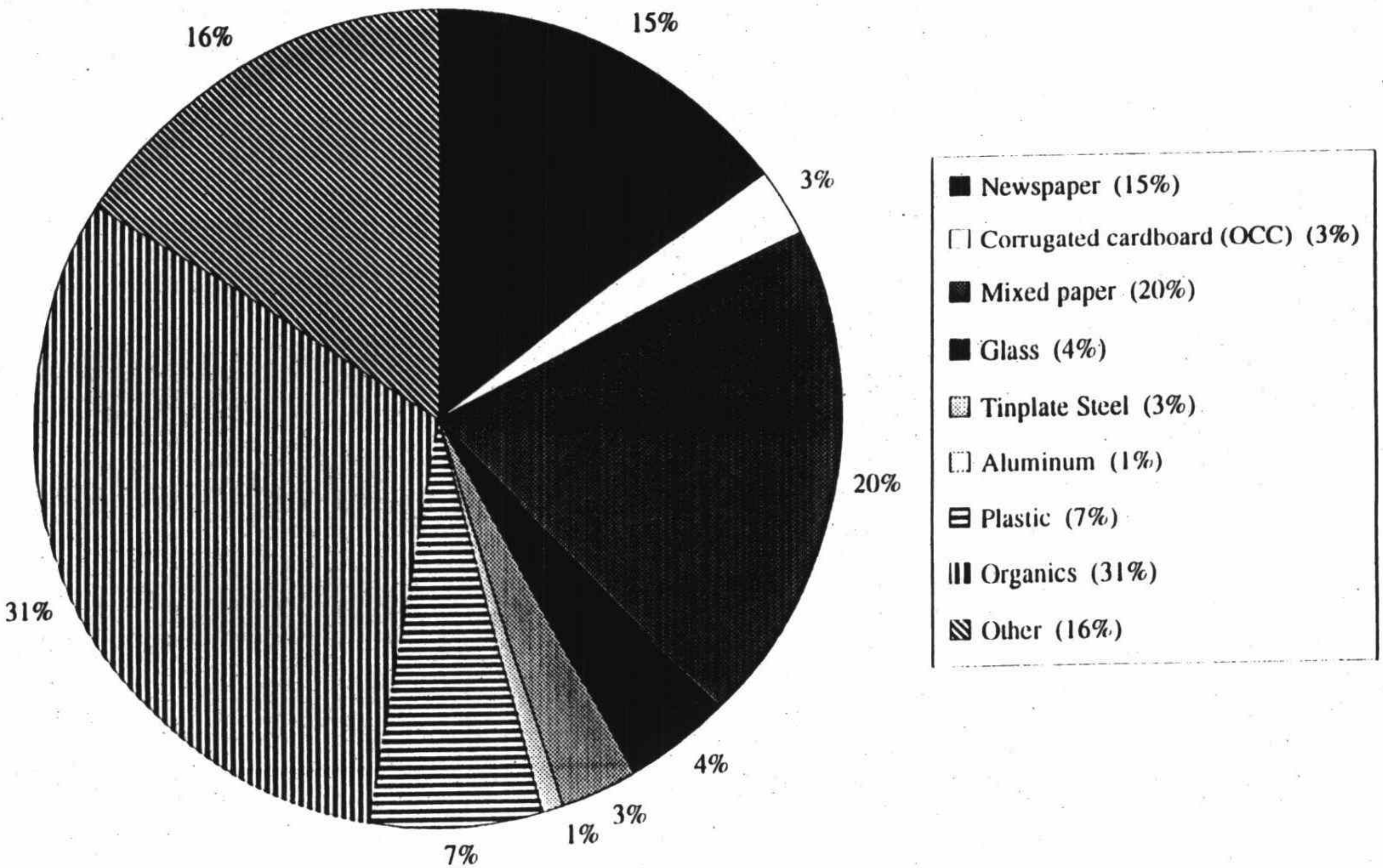
Table 4.16 presents estimates of the composition of residential waste generated, diverted and disposed in Region of York in 1992. The table shows that approximately 196,250 tonnes of residential waste were generated in 1992. It is estimated that approximately 176,898 tonnes were generated by single-family households, and 19,352 tonnes were generated by multi-family households. An estimated 54,100 tonnes of residential waste were diverted, and 142,150 tonnes were disposed in Region of York in 1992.

The residential waste generated in Region of York is estimated to have had the following composition:

- 17% newspaper;
- 18% other paper;
- 5% glass;
- 3.7% tinplate steel;
- 1% aluminum;
- 5.7% plastic;
- 22.5% food;
- 14.7% yard waste;
- 2.7% disposable diapers;
- 9.7% other materials.

Accurate diversion rates cannot be estimated for each material with the available data, as 6,025 tonnes (11.1%) of the total residential waste stream recycled in 1992 is described as "other"

Figure 4.2
Metropolitan Toronto
Composition of Disposed Residential Waste
1992



Note: Values shown on figure may not agree with text and Table due to rounding.

Table 4.16
Region of York
Residential Waste Composition Estimates

Component	Residential Waste Generated (tonnes) All Households	Residential Waste Generated S-F Hhlds	Residential Waste Generated M-F Hhlds	Residential Diversion (tonnes) 1992	Residential Waste Landfilled (by difference) 1992	Composition of Disposed Waste %
Total Residential Waste (tonnes)	196,250	176,898	19,352	54,100	142,150	
Paper						
Newspaper	32,899	29,078	3,822	16,641	16,258	11
Corrugated cardboard (OCC)	5,075	4,485	590	677	4,397	3
Telephone Directories	367	324	42	75	292	0
Mixed paper	30,433	26,897	3,535	69	30,364	21
Subtotal (Paper)	68,774	60,785	7,989	17,462	51,312	36
Glass	9,800	8,661	1,138	5,770	4,030	3
Tinplate Steel (ferrous)	7,238	6,486	752	2,796	4,442	3
Aluminum (non-ferrous)	1,925	1,701	224	91	1,834	1
Plastic						
PET	403	356	47	282	122	0
HDPE	683	604	79	404	279	0
Other Plastic	10,113	8,939	1,175		10,113	7
Subtotal (Plastic)	11,200	9,899	1,301	686	10,514	7
Organics						
Food wastes	44,099	38,977	5,123	3,338	40,761	29
Yard waste	28,890	28,890	0	17,871	11,019	8
Subtotal (Organics)	72,989	67,867	5,123	21,209	51,780	36
Wood Waste	1,575	1,392	183		1,575	1
Construction/Demolition Waste	2,975	2,629	346		2,975	2
Disposable Diapers	5,250	4,640	610		5,250	4
Textiles/Leather/Rubber	8,050	7,115	935	61	7,988	6
Other	6,475	5,723	752	6,025	450	0
Subtotal (Wood - Other)	24,325	21,499	2,826	6,087	18,238	13
TOTAL	**196,250**	**176,898**	**19,352**	**54,100**	**142,150**	**100**

Diversion = 28%

Notes:
1) Composition estimates based on East York data from "Residential Waste Composition Study, Vol. I of the Ontario Waste Comp. Study", Gore & Storrie Ltd., Jan/91 (excl. yard waste)
2) Yard Waste (comp. generated) data from "The Physical and Economic Dimensions of Municipal Solid Waste in Ontario", CH2MHill Eng. Ltd., Nov/91
3) White Goods (comp. generated) estimate (included in Tinplate Steel total) from "Residential Waste Comp. Study, Vol. I of the Ontario Waste Comp. Study", G & S Ltd., 1990
4) Relative plastics composition based on Beck et al, 1992
5) Household data provided by Hardy Stevenson & Associates, 1994
6) Diversion estimates provided by Markham, Richmond Hill and Region of York
7) Number of backyard composters provided by York Region staff, 1993
8) Households: S-F - 128,466; Semi/Town/Row - 14,495; Low Rise - 5,410; M-F - 13,283. Note that Semi/Town/Row included with S-F, Low Rise included with M-F for this analysis.

material. Based on the available data, the disposed residential waste stream had the following composition:

- 11% newspapers;
- 25% other papers;
- 3% glass;
- 4% metal;
- 7% plastic;
- 37% food and yard waste;
- 13% other materials.

These waste composition data are presented in Figure 4.3.

4.7 Residential Waste Composition Estimate for Region of Peel

Table 4.17 presents estimates of the composition of residential waste generated, diverted and disposed in Region of Peel in 1992. The table shows that approximately 313,296 tonnes of residential waste were generated in 1992. Of this total, an estimated 238,153 tonnes were generated by single-family households, and an estimated 75,143 tonnes were generated by multi-family households. An estimated 59,967 tonnes of residential waste were diverted, and 253,329 tonnes were disposed in Region of Peel in 1992.

The residential waste generated in Region of Peel is estimated to have had the following composition:

- 17.2% newspaper;
- 18.8% other paper;
- 5.1% glass;
- 3.8% tinplate steel;
- 1% aluminum;
- 6% plastic;
- 23.1% food;
- 12.4% yard waste;
- 2.7% disposable diapers;
- 10% other materials.

Based on the available data, the disposed residential waste stream had the following composition:

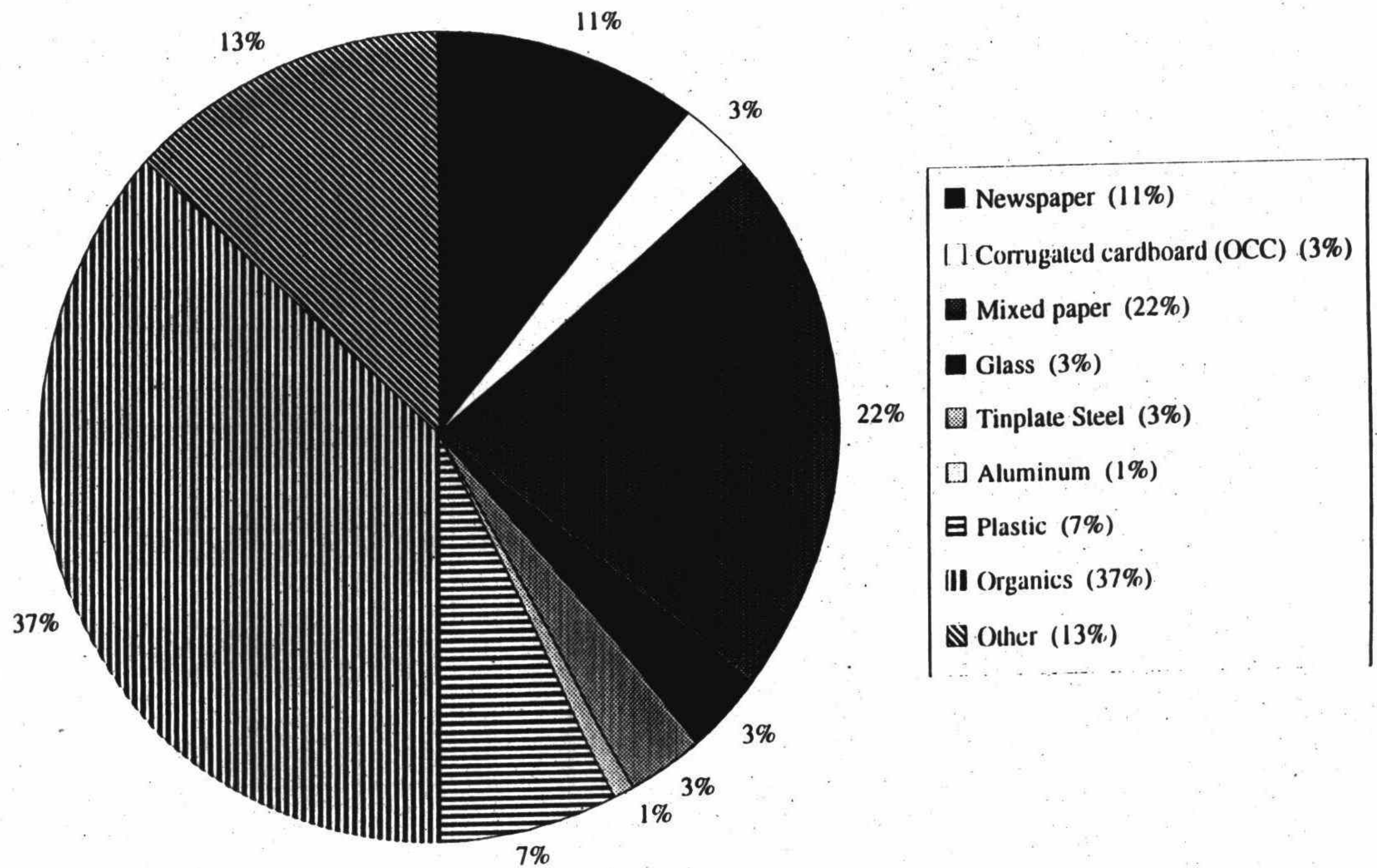
- 13% newspapers;
- 22% other papers;
- 4% glass;
- 4% metal;
- 7% plastic;
- 37% food and yard waste;
- 13% other materials.

These waste composition data are presented in Figure 4.4.

4.8 Residential Waste Composition Estimate for Region of Halton

Table 4.18 presents estimates of the composition of residential waste generated, diverted and disposed in Region of Halton in 1992. The table shows approximately 135,193 tonnes of residential waste was generated in 1992. Of this, it is estimated that approximately 112,375 tonnes were generated by single-family households, and 22,818 tonnes were generated by

Figure 4.3
Region of York
Composition of Disposed Residential Waste
1992



Note: Values shown on figure may not agree with text and Table due to rounding.

Table 4.17
Region of Peel
Residential Waste Composition Estimates, 1992

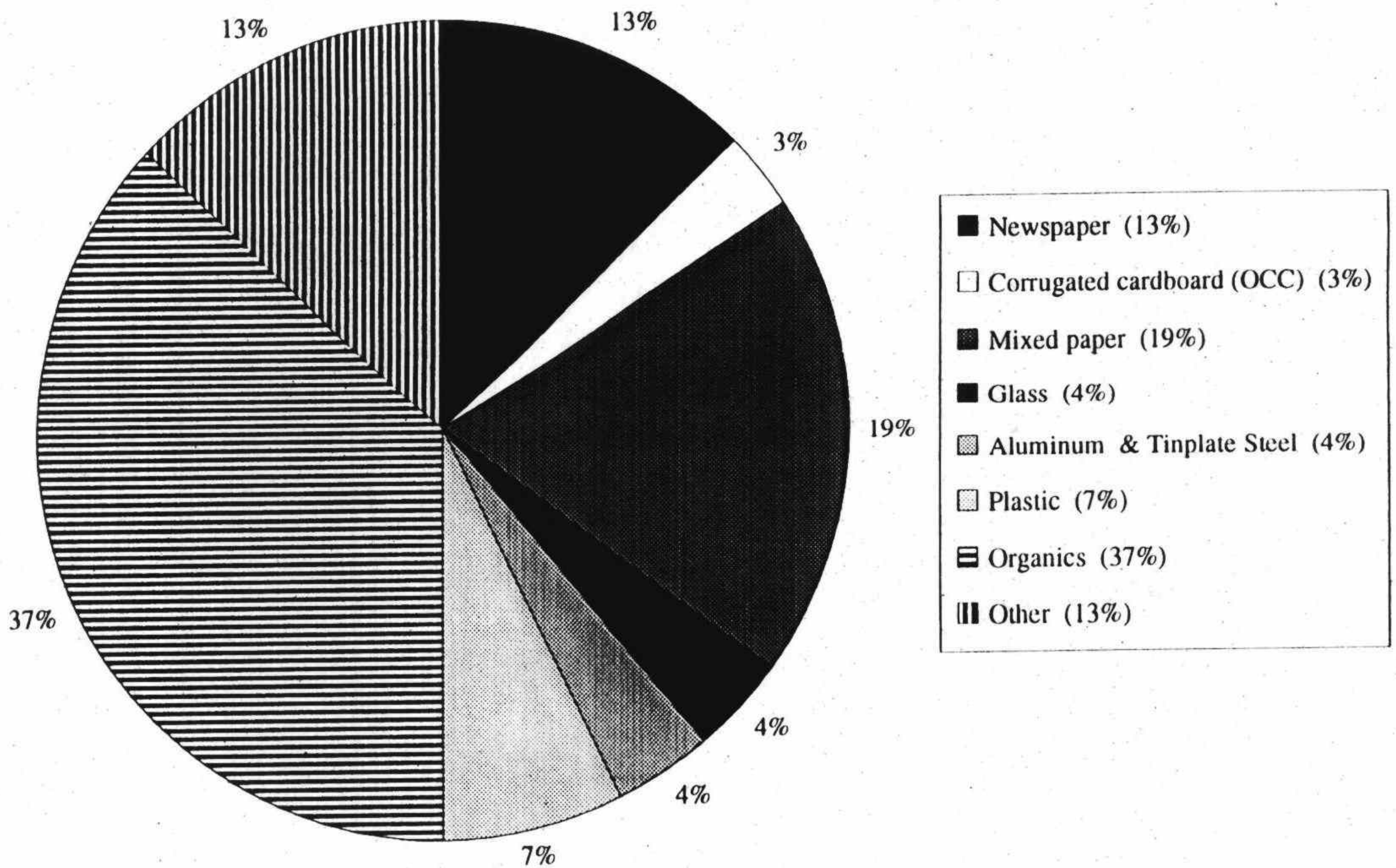
Component	Residential Waste Generated (tonnes) - 1992 All Households	Residential Waste Generated S-F Hhlds	Residential Waste Generated M-F Hhlds	Residential Diversion (tonnes) - 1992	Residential Waste Landfilled (by difference) 1992	Composition of Disposed Waste %
Total Residential Waste (tonnes)	313,296	238,153	75,143	59,967	253,329	
Paper						
Newspaper	53,909	39,147	14,763	21,534	32,375	13
Corrugated cardboard (OCC)	8,316	6,039	2,277	1,234	7,082	3
Telephone Directories	859	653	206	712	147	0
Mixed paper	49,609	35,995	13,614	469	49,140	19
Subtotal (Paper)	112,694	81,833	30,860	23,949	88,745	35
Glass	16,058	11,661	4,397	6,674	9,384	4
Tinplate Steel (ferrous)	12,024	8,731	3,293			
Aluminum (non-ferrous)	3,154	2,290	864			
Subtotal (Alum. + Tin)	15,178	11,022	4,156	6,137	9,041	4
Plastic						
PET	661	480	181			
HDPE	1,119	813	307			
Other Plastic	16,572	12,034	4,538			
Subtotal (Plastic)	18,352	13,327	5,026	694	17,658	7
Organics						
Food wastes	72,262	52,473	19,788	6,532	65,730	
Yard waste	38,894	38,894	0	10,735	28,159	
Subtotal (Organics)	111,155	91,367	19,788	17,267	93,889	37
Wood Waste	2,581	1,874	707	2,490	91	
Construction/Demolition Waste	4,875	3,540	1,335	142	4,733	
Disposable Diapers	8,603	6,247	2,356		8,603	
Textiles/Leather/Rubber	13,191	9,578	3,612	390	12,801	
Other	10,610	7,704	2,905	2,224	8,386	
Subtotal (Wood - Other)	39,859	28,944	10,915	5,246	34,613	14
TOTAL	**313,296**	**238,153**	**75,143**	**59,967**	**253,329**	**100**

Diversion = 19%

Notes:

1) Composition estimates based on East York data from "Residential Waste Composition Study, Vol. I of the Ontario Waste Comp. Study", Gore & Storrie Ltd., Jan/91 (excl. yard waste).
2) Yard Waste (comp. generated) data from "The Physical and Economic Dimensions of Municipal Solid Waste in Ontario", CH2MHill Eng. Ltd., Nov/91
3) White Goods (comp. generated) estimate (included in Tinplate Steel total) from "Residential Waste Comp. Study, Vol. I of the Ontario Waste Comp. Study", G & S Ltd., 1990
4) Relative plastics composition based on Beck et al, 1992
5) Household data provided by Hardy Stevenson & Associates, 1994
6) Diversion estimates for Existing System obtained from Region of Peel 1992 Annual Report.
7) Number of backyard composters provided by Region of Peel staff, 1993.
8) Households: S-F - 117,152; Semi/Town/Row - 54,783; Low Rise - 9,800; M-F - 55,039. Note that Semi/Town/Row included with S-F; Low Rise included with M-F for this analysis.

Figure 4.4
Region of Peel
Composition of Disposed Residential Waste
1992



Note: Values shown on figure may not agree with text and Table due to rounding.

Table 4.18
Region of Halton
Residential Waste Composition Estimates, 1992

Component	Residential Waste Generated (tonnes) 1992	Residential Waste Generated (tonnes) S-F Hhlds	Residential Waste Generated (tonnes) M-F Hhlds	Residential Diversion (tonnes) 1992	Residential Waste Landfilled (by difference) 1992	Composition of Disposed Waste %
Total Residential Waste (tonnes)	135,193	112,375	22,818	46,393	88,800	
Paper						
Newspaper	22,978	18,472	4,506	15,923	7,055	8
Corrugated cardboard (OCC)	3,544	2,849	695	2,177	1,367	2
Mixed paper	21,511	17,293	4,218		21,511	24
Subtotal (Paper)	48,034	38,614	9,420	18,100	29,934	34
Glass	6,844	5,502	1,342	4,944	1,900	2
Tinplate Steel (ferrous)	5,007	4,120	887			0
Aluminum (non-ferrous)	1,344	1,081	264			0
Plastic						
PET	282	226	55			
HDPE	477	384	94			
Other Plastic	7,063	5,678	1,385			
Subtotal (Tin, Alum,Plastic)	14,173	11,489	2,684	3,650	10,523	12
Organics						
Food wastes	30,800	24,760	6,040	2,953	27,847	
Yard waste	18,352	18,352	0	16,390	1,963	
Subtotal (Organics)	49,153	43,113	6,040	19,343	29,809	34
Wood Waste	1,100	884	216		1,100	
Construction/Demolition Waste	2,078	1,670	407	356	1,722	
Disposable Diapers	3,667	2,948	719		3,667	
Textiles/Leather/Rubber	5,622	4,520	1,103		5,622	
Other	4,522	3,635	887		4,522	
Subtotal (Wood - Other)	16,989	13,657	3,332	356	16,633	19
TOTAL	**135,193**	**112,375**	**22,818**	**46,393**	**88,800**	**100**

Diversion = 34%

Notes:
1) Composition estimates based on East York data from "Residential Waste Composition Study, Vol. I of the Ontario Waste Comp. Study", Gore & Storrie Ltd., Jan/91 (excl. yard waste).
2) Yard Waste (comp. generated) data from "The Physical and Economic Dimensions of Municipal Solid Waste in Ontario", CH2MHill Eng. Ltd., Nov/91
3) White Goods (comp. generated) estimate (included in Tinplate Steel total) from "Residential Waste Comp. Study, Vol. I of the Ontario Waste Comp. Study", G & S Ltd., 1990
4) Relative plastics composition based on Beck et al, 1992
5) Household data provided by Hardy Stevenson & Associates,1994
6) Diversion estimates provided by Region of Halton, 1993
7) Number of backyard composters provided by Region of Halton staff, 1993.
8) Households: S-F - 73,258; Semi/Town/Row - 16,536; Low Rise - 5,418; M-F - 16,374. Note that Semi/Town/Row included with S-F; Low Rise included with M-F for this analysis.

multi-family households. An estimated 46,393 tonnes of residential waste were diverted, and 88,800 tonnes were disposed.

The residential waste generated in Region of Halton is estimated to have had the following composition:

- 17% newspaper;
- 19% other paper;
- 5% glass;
- 3.7% tinplate steel;
- 1% aluminum;
- 5.8% plastic;
- 23% food;
- 13% yard waste;
- 2.7% disposable diapers;
- 9.9% other materials.

Based on the available data, the disposed residential waste stream had the following composition:

- 8% newspapers;
- 26% other papers;
- 2% glass;
- 12% metal and plastic;
- 33% food and yard waste;
- 19% other materials.

These waste composition data are presented in Figure 4.5.

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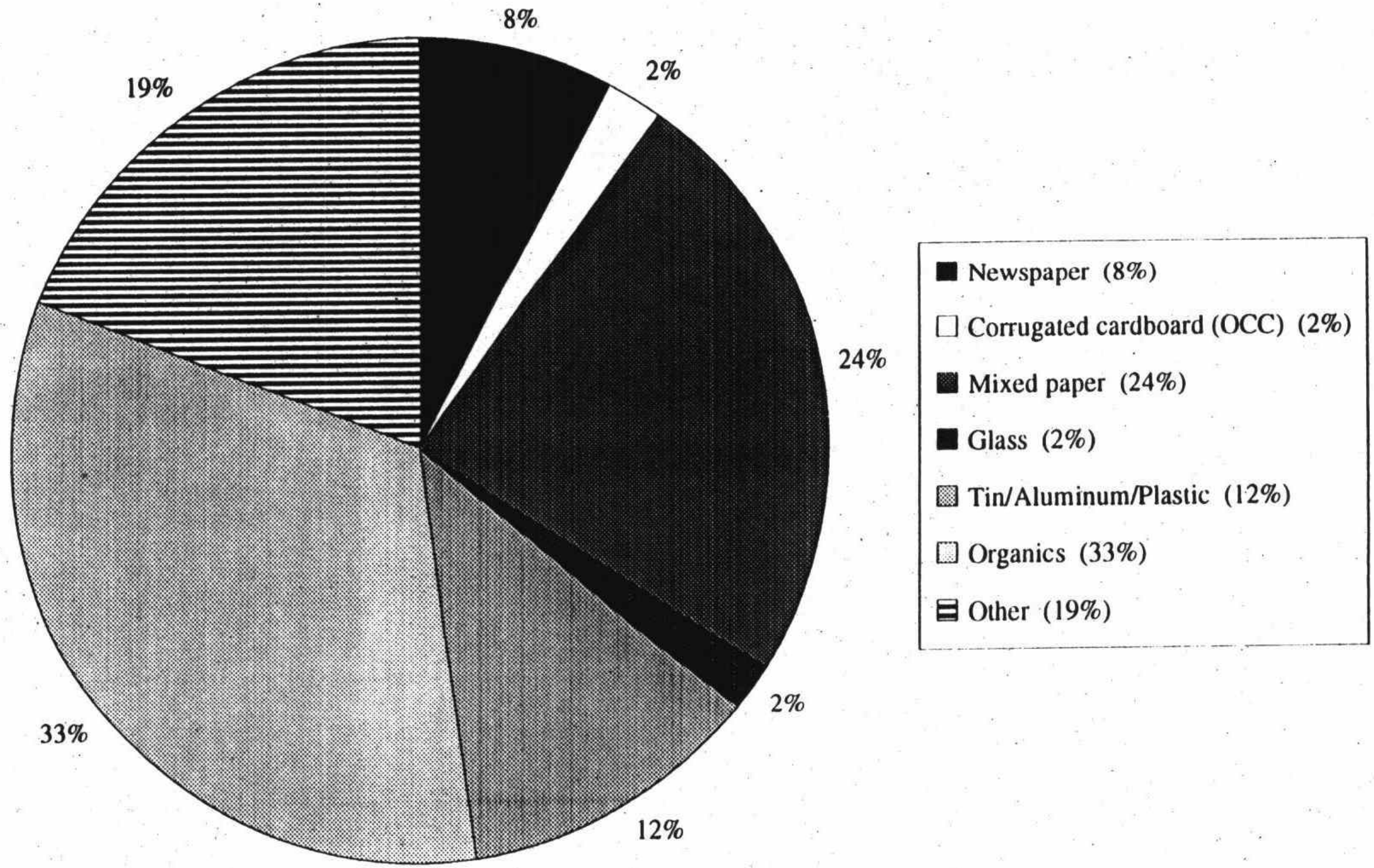
Figure 4.5
Region of Halton
Composition of Disposed Residential Waste
1992



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5.0 APPROACH TO RESIDENTIAL SYSTEM DIVERSION ESTIMATES

5.1 Introduction

This chapter describes the residential waste diversion systems analysed in the GTA 3Rs Analysis, and describes the methodology and assumptions used to develop the diversion estimates for each system. Region-specific issues and estimates are presented in chapters 6 to 10.

5.2 Residential System Descriptions

The six residential waste diversion systems evaluated in the GTA 3Rs analysis are:

Residential System 1 Existing;
Residential System 2 Existing/Committed;
Residential System 3 Direct Cost;
Residential System 4 Expanded Blue Box;
Residential System 5 Wet/Dry;
Residential System 6 Mixed Waste Processing.

The Existing and Existing/Committed systems were based on existing or planned programs in each Region. The four additional systems were developed to provide distinctly different approaches to waste diversion:

- the Direct Cost system uses an economic incentive to maximize use of existing waste diversion services by householders;
- the Expanded Blue Box system provides the opportunity to recycle a wider range of dry materials, as well as promoting backyard composting and source separation of leaf and yard waste for wet materials;
- the three stream Wet/Dry system provides for curbside collection of separated wet and dry materials and requires central composting of household organics;
- the Mixed Waste Processing system directs the "third bag" of garbage currently sent to disposal to a mixed waste processing and composting plant for further diversion of some dry materials, and composting of the remaining waste stream.

A description of each system is presented in the following sections. More detailed descriptions of each approach are contained in the Schedules to the Service Technical Appendix (Volume 2).

5.2.1 Residential System 1 - Existing

The Existing residential waste diversion system in each Region consists of a combination of components in use as of December 31, 1992.

All regions provide curbside collection of Blue Box materials to most of their single-family residents. The range of materials varies from the basic list of materials (ONP, glass, tinplate steel, aluminum and PET), to an expanded list including some or all of the following materials: OCC, telephone books, magazines, textiles, plastics, etc. Some opportunities are provided to multi-family residents to recycle, either through provision of containers in multi-family buildings, or the provision of depots at convenient locations. Rural and self-haul households are served by depots at landfill sites and other locations.

All collected materials are processed in a series of MRFs which can be owned by either the Region or a private contractor. Operation of the MRF can be either by municipal forces, or by contract to the region.

Separate leaf and yard waste collection is generally provided on a seasonal basis, and these materials are composted at a series of open windrow composting sites throughout the GTA.

All regions have aggressively promoted the use of backyard composters. These units are generally provided to householders at subsidized prices, and can be either picked up at regional facilities, or delivered at an extra charge. Some regions are exploring appropriate approaches to composting for multi-family residents, but these efforts have not progressed significantly to date.

Additional waste diversion efforts include collection of Christmas trees, household hazardous waste and bulky goods such as white goods either curbside or through drop-off depots. A number of pilot projects have also taken place to explore the possibility of collecting household organics in the curbside collection system (Metro, Mississauga, Halton). No full scale household organics collection programs have been implemented to date.

Extensive promotion/education efforts have been on-going for some time, to improve participation in Blue Box and other recycling efforts, and also to encourage reuse and waste reduction as much as possible.

Existing residential waste diversion efforts diverted between 19% and 28% of the residential waste stream in all GTA regions except Halton in 1992. Halton achieved an estimated 34% diversion of residential waste in 1992.

5.2.2 Residential System 2 - Existing/Committed

The Existing/Committed System includes the following major elements:

- commitments made in the regional five year capital funding budgets, (1994-1998) (or the 1993-1997 capital funding budgets if the most recent budgets were not available) which were considered likely to proceed by regional staff;
- policy commitments at the regional, provincial or federal level, which had been announced by the end of 1992.

Regional-specific capital commitments are discussed in Chapters 6 to 10.

The policy commitments considered part of the Existing/Committed System include:

- the provincial 3Rs Regulations, which were promulgated in March 1994;
- the National Packaging Protocol (NAPP), a voluntary program committed to by packaging users across Canada; and
- the Canadian Industry Packaging Stewardship Initiative (CIPSI).

The provincial 3Rs Regulations (promulgated on 3 March 1994) have a number of requirements for municipalities. These include:

- source separation programs must be provided by all municipalities with a population of 5,000 or more;

- if garbage is collected at the curbside from residential sources then recyclable materials must also be collected at the curbside. Frequency of curbside collection of recyclables must be at least half that of curbside garbage collection;

- if garbage is accepted from residential sources at a waste disposal site (depot or landfill) then measures must be put in place to accept recyclable materials at the site;

- all materials on the "basic list" (newsprint, food and beverage containers made of: aluminum, glass, PET, steel) and at least two materials from the supplementary list (aluminum foil, boxboard and paperboard, OCC, fine paper, foam plastics, polycoat, paperboard containers, magazines, plastic film, paper cups and plates, rigid plastic containers, telephone directories, textiles (excluding fibreglass, carpet)) must be collected;

- residents must be provided with instructions on proper procedures for source separation and feedback on how much material is being diverted from landfill;

- municipalities with a population of 5,000 or more must implement a backyard composting program, which must include the provision of home composters at cost or less, and a communications program;

- municipalities with a population of 5,000 or more must compost leaf and yard waste if they collect these wastes separately;

- municipalities of 50,000 or more must implement a leaf and yard waste collection system, and compost (or directly land apply) the diverted materials. The collection system must provide reasonably convenient service, and can consist of curbside collection, the provision of depots, or a combination of both;

- owners of multi-unit buildings with six or more dwelling units are required to provide a source separation program, if the building is located in a municipality with a population of 5,000 or more. The materials to be collected include: food and beverage containers made of aluminum, glass, steel or PET; newsprint and other types of materials which are collected in the local municipal Blue Box program. Municipalities must collect recyclables from residential sources including apartment buildings.

Most GTA municipalities meet most of the requirements of the 3Rs Regulations for collection of dry recyclables at this time, therefore the incremental diversion impact of meeting the requirements will not be significant. Most GTA municipalities provide some level of leaf and yard collection, and where additional service is required, this can be provided by a combination of curbside and depot service. All GTA municipalities provide backyard composting programs, therefore significant additional effort will not be required to meet the requirements of the 3Rs Regulations. Additional service will be required at multi-family residences in buildings of six or more units which do not currently have a source separation program. Additional dry materials may be source separated as a result of this requirement. Municipalities will be required to collect these materials, and arrange for processing.

The National Packaging Protocol (NAPP) is a federal program that established targets of 20% packaging waste reduction by 1992, 35% by 1996 and 50% by 2000, compared with packaging disposal in 1988. The initiative, which is co-ordinated by the Federal Government,

seeks to draw industry into a voluntary process of packaging reductions. Policies were established through NAPP to ensure that packaging has minimal effect on the environment, is managed through 3Rs, and that promotion and education is provided to increase public awareness of the environmental impacts of packaging. NAPP applies to domestic as well as imported packaging.

NAPP is monitoring achievements attributable to the program and has recently produced its first *Milestone Report* (National Taskforce on Packaging, 1993). This report is based on responses from 32 industry sectors across the country, reporting on production, use, reuse and recycling of 32 packaging material types. While all goals are not yet met, according to NAPP, a 21% reduction in the amount of packaging has been achieved, with varying degrees of progress among different material types.

The Canadian Industry Packaging Stewardship Initiative (CIPSI) is a product stewardship program that has been organized by a coalition of leading Canadian manufacturers, material suppliers, and retailers. This group has proposed a national recycling program to achieve a 50% reduction in all packaging going to disposal. A key element of the CIPSI plan is to provide economic incentives which reward the use of highly recyclable materials . CIPSI encompasses a significant market development component and proposes a system of industry levies in which each industry member pays a fee in proportion to the actual costs of managing their packages that would be collected under the product stewardship scheme. This model would incorporate market development incentives with a rebate paid to industry members who are able to utilize secondary packaging.

The CIPSI model has been accepted in Manitoba, and is currently under negotiation in Ontario, B.C. and Nova Scotia. If implemented, backdrop regulations would likely be developed that require all companies who sell consumer products in a province to belong to an organization which recovers and recycles the used packaging. Both NAPP and CIPSI are ongoing initiatives that are likely to impact on the generation and recovery of packaging waste by the residential sector.

5.2.3 Residential System 3 - Direct Cost

The objective of the Direct Cost System is to provide an economic incentive to residents to make maximum use of source separation and diversion methods which are available in the Existing/Committed system at no direct charge to the householder.

The Direct Cost System would build on the Existing/Committed residential waste diversion system. Single-family residents would pay a fee for garbage disposal in a pay-by-the-bag system. Blue Box collection of dry materials and seasonal collection and composting of leaf and yard waste would continue at current levels of service, and would be provided at no direct charge to the householder. Backyard composting would be aggressively promoted, by door-to-door delivery (possibly at no charge or at a nominal charge) of units. Composting by multi-family residents would also be encouraged, through promotion of community composting and vermi-composting.

The advantages of a Direct Cost System include:

- it creates an economic incentive for waste reduction;
- residents realize direct cost avoidance through waste reduction;
- residents pay in proportion to the wastes generated.

The disadvantages of a Direct Cost System are as follows:

- it may be initially be received negatively by the public;
- it may discriminate against low income or high occupancy households;
- it requires complex administration and can often be expensive to implement and operate;
- it may lead to illegal dumping and burning of garbage;
- it may be difficult to control some of the problem elements (such as over-stuffed and heavy bags/containers);
- it does not generally impact on multi-family residents whose garbage is generally managed by the building owner and private contractors.

There are many types of Direct Cost Systems, described in Schedule D of the Service Technical Appendix. For the GTA analysis, it was assumed that a simple pay by the bag (or tag) system would be implemented at a cost of $1.00 per bag/tag. This is close to the actual cost of garbage management (Proctor and Redfern, 1993, RIS 1990). The system would be supplemented with a strong promotion/education campaign to encourage the 3Rs, and explain the benefits and fairness of a Direct Cost System. This system impacts on diversion behaviour of single-family residents, but does not impact on multi-family residents, as their garbage is managed by the private sector.

5.2.4 Residential System 4 - Expanded Blue Box

An Expanded Blue Box System is essentially Blue Box recycling incorporating an expanded range of dry recyclable materials. It attempts to achieve maximum diversion of dry recyclable materials using existing or modified facilities, and systems currently available to the Regions.

This system would include extensive promotion of backyard composting, to allow residents the opportunity to divert organics from disposal. Separate collection of leaf and yard wastes would also contribute to diversion of organics. An extensive promotion/education campaign would be required, to ensure that householders understand which materials are included in the expanded program, and also to encourage waste reduction, backyard composting and source separation of leaf and yard waste. A number of expanded dry material recycling programs are described in Schedule E of the Service Technical Appendix.

This system is different to a three stream wet/dry approach (Residential System 5) in that it does not depend on central composting of household wet wastes as a component of the system.

The dry materials that would be collected in this system would include:

- newspaper (ONP);
- corrugated cardboard (OCC);
- boxboard;
- polycoat (e.g. milk cartons);
- phone books;
- magazines and catalogues (OMG);
- mixed household paper;
- steel cans;
- aluminum cans;
- aluminum trays and foil;
- clear and coloured glass;
- PET;
- rigid plastic bottles & tubes (HDPE, PVC, PP, LDPE);
- film plastic (LDPE);
- foam plastic and rigid trays (PS);
- textiles.

5.2.5 Residential System 5 - Wet/Dry System

The term "wet/dry" is commonly used to refer to a type of solid waste collection program where the householders are required to separate their waste into 2 distinct streams - the wet or the organic fraction, and the dry, which consists of fibres, plastic, metals, etc. The three stream approach, where householders separate their waste into three streams: wet, dry and garbage, was used for system development and waste diversion estimates.

Implementation of a comprehensive three stream wet/dry system in GTA Regions would require all householders to separate their waste into three streams: wet waste, dry recyclables and garbage. There are a number of three stream collection options available, described in Schedule F of the Service Technical Appendix. For the GTA 3Rs analysis it was assumed that 240L (90 gallon) carts would be provided to all single-family households for the collection and storage of the wet waste, dry waste and garbage streams. New central in-vessel composting facilities would be required for processing of wet waste.

The viability of implementing successful three stream collection of waste from multi-family buildings in GTA is somewhat uncertain at this stage, as the garbage management system in most older buildings is typically based on a single-chute system. Many buildings provide an option for recycling of dry materials to residents, by providing bins on the ground floor, or in the basement of the building, where source separated recyclables can be deposited. A similar approach would likely be necessary for three stream wet/dry collection, where an additional bin would be provided for voluntary separation of food waste. This would likely be delivered in sealed bags by residents. This option will only be possible in some multi-family residences, where space permits.

Backyard composting would be strongly promoted through door-to-door sales or delivery (possibly at no charge, or at a nominal charge) of backyard composters. Leaf and yard waste would continue to be collected during the growing season. Separate collection of brush may be required because of capacity limitations. This system would require extensive promotion/education, as it requires a significant change in habits for the householder. Wet/dry systems have worked successfully in Europe for a number of years, and have been tested on a pilot scale in Ontario. Some full scale systems have been implemented in a number of (small) Canadian communities.

A variation on the Wet/Dry System was suggested by the Composting Council of Canada during the public consultation process. This hybrid Wet/Dry System would collect the dry materials required to be source separated under the 3Rs Regulations, retain backyard composting at the levels in the Existing/Committed System, and would compost source separated household organics in a central composting system.

5.2.6 Residential System 6 - Mixed Waste Processing System

The Mixed Waste Processing System is an "add-on" to the Existing/Committed System, for processing of the "third bag" of garbage which remains after recyclables and leaf and yard wastes have been diverted in separate collections. The system would involve some additional separation of dry recyclables at the mixed waste processing and composting plant, and composting of the remaining mixed waste stream.

Backyard composting would be aggressively promoted, through door-to-door delivery (possibly at no charge, or at a nominal charge) of units. Composting by multi-family residents would also be encouraged, through promotion of community composting and vermi-composting.

One of the advantages of this system over the other systems is that it provides the opportunity to divert waste disposed by multi-family dwellings.

5.3 General Assumptions Used For Diversion Estimates

The methodology used to develop residential waste diversion system estimates was similar for each Region. The general approach (by system) is described in sections 5.4 to 5.9. General assumptions common to most or all systems are described in this section.

5.3.1 General Assumptions

Number and Type of Households

Residential diversion estimates are based on population and household estimates that were developed by the Social Environment Discipline (HSA, 1994) through consultation with GTA Regional staff and also review of Statistics Canada data. These estimates, are summarized in Table 4.2 in Section 4 of this Appendix.

The proportion of single-family and multi-family households in each Region was used for residential waste allocation estimates. The proportion of single and multi-family households in each region in 1991 is presented in Table 5.1. This was the most detailed breakdown available at the level of detail required by the study team and was assumed for waste diversion estimates.

Table 5.1
Greater Toronto Area
Percentage of Household Types
Proportion of Single-Family and Multi-Family Households by GTA Region
1991

Region	Single Family Households			Multi-Family Households		
	Single Family (%)	Semi/ Town Row (%)	Total Single Family (%)	Low Rise (%)	High Rise (%)	Total Multi-Family (%)
Metro	33.2	18.1	51.3	12.8	35.8	48.6
Durham	69.0	16.3	85.3	6.8	7.9	14.7
Halton	65.6	14.8	80.4	4.8	14.7	19.5
Peel	49.4	23.1	72.5	4.1	23.3	27.4
York	79.8	9.2	89.0	3.4	7.6	11.0
GTA Total	**45.7**	**17.6**	**63.3**	**9.4**	**27.0**	**36.4**
Source: Hardy Stevenson and Associates, 1994.						

Dry Waste Diversion Rates

Capture rates measured in the Quinte Blue Box 2000 program are used as the basis for estimates of recovery of dry recyclables in the Direct Cost (3), Expanded Blue Box (4) and Wet/Dry (5) systems. (Quinte Regional Recycling, 1993). These capture rates were used because the program is based in Ontario, it includes backyard composting and curbside leaf and yard waste collection (which are currently components of the GTA systems), a wide range of dry materials is collected, and capture rates are available for each material, which is a major benefit of this data, compared to information obtained from other expanded dry programs. The Edmonton program which collects an expanded list of dry materials had a higher total recovery rate per household than Quinte, but data were not available on a material-by-material basis which was required for this analysis. The capture rates used are presented in Table 5.2.

Capture Rates for Multi-Family Households

For systems for which a separate calculation was required, it was assumed that the multi-family households divert dry materials at 50% of the single-family household rate. This assumption is based on an analysis of single-family and multi-family capture rate data from the Capital Region District (Victoria, BC), Ottawa, North York, Mississauga and Etobicoke. A more detailed discussion of multi-family diversion is presented in Schedule B of this Appendix.

In the Wet/Dry System, diversion estimates assumed that, over time, multi-family households could divert household food waste at 50% of the single-family rate. This estimate may be somewhat optimistic, but it assumes that opportunities to participate in three stream source separation will be provided to at least 50% of multi-family households in each Region, and that reasonable participation levels can be achieved through extensive promotion and education

Greater effort is required by multi-family residents to compost, and data collected to date suggest that participation in neighbourhood and community based composting programs by multi-family residents is lower than in single family households. An estimate of 54 kg/hh/yr for multi-family composting of food waste in central units has been assumed for this study. This is based on the results of a study conducted in Barrie, Ontario, where multi-family households participated in a pilot project to compost food waste (Collins, 1994). With a strong promotion/education campaign, a participation rate of up to 50% of multi-family units in GTA is assumed with a diversion rate of 54 kg/yr per participating household.

A discussion of multi-family composting is provided in Schedule C of the Service Technical Appendix.

Allocation of diversion of Non-Blue Box Materials in the Direct Cost (3), Expanded Blue Box (4) and Wet/Dry (5) Systems

In each of Systems 3, 4, and 5, the existing diversion tonnages for non-Blue Box materials (wood, construction/demolition waste, textiles/leather/rubber, and other materials) were allocated based on the assumption that 90% of this type of material is diverted by single-family households, with the remaining 10% diverted by multi-family households. Diversion rates for these materials were assumed to stay at current levels (a conservatively low estimate).

Other Policies

The CIPSI (Canadian Industry Packaging Stewardship Initiative) is an effort by brand owners to move packaging stewardship plans forward across Canada. If implemented, the CIPSI plan could create incentives to increase residential waste diversion by municipalities and may result

Table 5.2

Dry Material Capture Rates Used for Residential System Diversion Estimates

Material Category	Recyclable Fraction (%)	Quinte Capture Rates (recyclables) (%)	Capture Rates (Overall) (%)
Paper			
Newspaper	100.0	82.4	82.4
Corrugated cardboard (OCC)	100.0	63.4	63.4
Telephone Directories	100.0	76.0	76.0
Mixed paper	36.8	37.5	13.8
Glass	94.4	74.5	70.3
Metal			
Tinplate Steel (ferrous)	82.7	78.0	64.5
Aluminum (non-ferrous)	50.2	81.7	41.0
Metal (commingled)	78.5	78.2	61.4
Plastic			
PET	100.0	83.4	83.4
HDPE	100.0	57.4	57.4
Other Plastic	68.6	22.0	15.1
Textiles	67.9	10.9	7.4

Source: Centre and South Hastings Waste Management Board, Quinte Regional Recycling, Blue Box 2000: The First Year, April, 1993

in collection of an increased range of dry materials. The impacts of this potential development have not been included in the diversion estimates for any of the systems.

Impacts of the National Packaging Protocol (NAPP) are addressed in source reduction estimates (discussed below).

Composition of Residential Waste Generated, Diverted and Disposed

The composition of residential waste generated was estimated using the method presented in Chapter 4. Diverted materials were subtracted from generated materials to estimate the composition of disposed waste for each system.

5.3.2 Source Reduction of Residential Waste

Source reduction includes measures that reduce the materials that have potential to become solid waste before they ever enter the solid waste stream. The measures may include some or all of the following:

- reduction in product volume and packaging;
- increasing product life and durability;
- promoting product redesign to encourage repair;
- purchasing products selectively to reduce product/packaging consumption;
- promoting reuse of products through refillable packages, reuse centres, garage and rummage sales;
- alternative landscaping such as xeriscaping and grass mulching;
- reducing the volume of junk mail;
- promoting repair/tailoring of appliances, clothing, footwear; and
- reduction of household hazardous wastes.

A more detailed discussion of source reduction is presented in Schedule B of this Appendix. The Schedule explains the limitations of source reduction estimates based on reliable data available at this time.

Source reduction of residential waste will occur as a result of at least two major factors:

1. changes in consumer behaviour;
2. policies and technologies which will reduce residential waste generation.

Because of the limitations in available data, and the uncertainty regarding future source reduction of residential waste, source reduction attributed to only two factors is included in residential waste diversion estimates. These are:

- NAPP; and
- increased education.

The National Packaging Protocol (NAPP) has targeted a 50% overall reduction in the packaging waste stream by the year 2000, relative to a 1988 baseline. Source reduction is the preferred option among the 3Rs. It is an objective that fifty percent of waste diversion shall be achieved through new source reduction and new reuse initiatives with recycling making up the remainder (National Taskforce on Packaging, 1993). Assuming that packaging constitutes 30% of the residential waste stream, this would lead to a 7.5% overall reduction by the year 2000. For the purpose of this study, a conservative estimate of 7.5% waste diversion through source reduction by the year 2015 has been adopted. A uniform source reduction rate of 0.33% per year has been assumed to achieve this value.

A further reduction, attributable to increased public education about waste reduction and reuse, has been assumed for this study. It is assumed that by 2015, an additional 0.5% reduction would be gained by extending the life of durable goods, reusing and repairing items, buying food in smaller quantities, using leftovers, etc. A uniform rate of 0.02% per year has been assumed to achieve this value.

Therefore, from a baseline year of 1992, to the year 2015 (23 years), source reduction is assumed to reduce the weight of residential waste disposed by a total of 8% achieved in the year 2015. An estimated 3% source reduction value is reached by the year 2000.

Source reduction estimates are used in the cumulative diversion estimates for each Residential and IC&I System combination for each Region presented in Chapter 15 of this Appendix.

5.3.3 Backyard Composting

Schedule C of the Service Technical Appendix discusses the results of several research studies on backyard composting. These studies were reviewed and were discussed with the authors/researchers to develop assumptions on which the diversion rate, through backyard composters, was estimated. The following assumptions used are as follows:

- For the Existing and Existing/Committed systems, distribution of backyard composters would continue to provide "coverage" levels of single-family households in place in 1992 and 1993 respectively;
- Backyard composters are assumed to be distributed to 80% of single-family households in all regions under the Direct Cost, Expanded Blue Box, Wet/Dry and Mixed Waste Processing Systems.
- In the Direct Cost System an estimated 90% of households provided composters are assumed to use them effectively (i.e. 72% of single-family households calculated as 90% of 80%). This system provides an incentive to utilize waste diversion options such as backyard composting which are provided at no direct charge to the householder.
- In the Expanded Blue Box and Wet/Dry Systems an estimated 80% of single-family households provided with composters are assumed to use them effectively. This is based on results of the Mississauga pilot program and the Quinte program which indicate that 80% to 82% of residents in an Expanded Blue Box System would use the units effectively. It is assumed that this rate also would be maintained in a Wet/Dry System and would result in 64% of single family households effectively using backyard composters.
- In the Mixed Waste Processing System, an estimated 70% of single-family households provided with composters are assumed to use them effectively. There is less incentive to source separate waste for diversion and to participate in options that require additional labour by residents in this system. This would therefore result in 56% of single family households effectively using backyard composters.
- Composter utilization assumptions are based on results from the Mississauga pilot program where backyard composters were distributed to 100% of households in a pilot area, and 80% of households in the pilot area used the composters effectively (Proctor and Redfern, 1994, Stanford, 1994). In the Quinte program 65% to 70% of residents have accepted composters to date (Quinte Regional Recycling, 1993),

and 82% of these use their composters effectively. With a strong promotion/education campaign and door to door, free distribution of composters, Quinte program analysts contend that higher saturation rates of backyard composters can readily be achieved (Centre and South Hastings Recycling Board, 1994);

- Waste diverted through backyard composters would consist of between 60% and 75% food and between 25% and 40% yard waste (Proctor & Redfern, 1994, Compost Management Associates, 1990). A composition of 68% food and 32% yard waste has been used for this analysis;

- Diversion was assumed at 169 kg/composter/yr from single family households participating in backyard composting. This is a finding of the Mississauga study which accounts for reduction in use during the winter months (Proctor and Redfern, 1994). These results are also within the range of 132 kg/composter/yr to 215 kg/composter/yr, estimated in a survey in the Quinte YIMBY (Yes In My Backyard) program (Centre & South Hastings Waste Management Board, 1994). This rate of diversion would be achievable only with a significant program of promotion and education and only after a period of use of at least a year;

- Residents with backyard composters will also participate in yard waste curbside collection programs, based on the Metro Toronto study showing that 70% of householders with backyard composters also separated yard waste for separate collection (Ferguson, 1993).

- Up to 50% of multi-family households will participate in on-site composting and could divert up to 54 kg/yr per participating household.

5.4 Diversion Estimates for Existing System

Residential waste diversion data for 1992 and earlier years were requested from staff at each of the GTA Regions and lower tier municipalities. Data received included quantities of recyclables collected from the Blue Box program, leaf and yard waste pick-up, recyclables dropped off at igloos, depots, container stations or transfer stations, and other miscellaneous collections, including household hazardous waste, white goods, bulky items, etc. Where possible, the diversion totals were subdivided by material type (e.g. newspaper, glass, plastic, etc.).

The number of backyard composters distributed in each Region by the end of 1992 were supplied to the Study Team by Regional and municipal staff. Diversion through backyard composting was estimated at 169 kg/composter/yr.

5.5 Diversion Estimates for Existing/Committed System

The Existing/Committed system includes:

- all components of the Existing System;
- any financial commitments made by the Regions in their most recent five-year capital budgets modified by information provided to the study team by Regional staff;
- policy announcements made by Regional, Provincial and Federal governments by the end of 1992;
- impacts of voluntary industry initiatives on municipal recycling systems.

In all cases, capital expenditure commitments were discussed with Regional staff to determine which items were expected to be constructed within an upcoming five year period, which, in most cases, extends from 1994 to 1998. Where available, projections sanctioned by Regional Councils were used. For Region of Peel, information was made available to identify commitments that would actually be put in place (Cave, 1994). Where possible, diversion estimates for these committed items were received from Regional staff.

Policy announcements incorporated in the Existing/Committed System also include the provincial 3Rs Regulations under the *Environmental Protection Act* which include several provisions related to municipal recycling.

GTA municipalities will be required to comply with the 3Rs Regulations by January 1, 1995 (MOEE, 1994). All GTA municipalities have populations of 5,000 or more, and will be required to meet the municipal requirements of the 3Rs Regulations. Many GTA municipalities have populations over 50,000 and must also meet the leaf and yard waste collection requirements.

Most GTA municipalities provide a basic level of Blue Box service to households who receive garbage collection. Some additional dry materials may be collected by municipalities who need to add dry materials to their programs to meet the requirements for collecting basic Blue Box materials plus two additional materials. Diversion through this additional requirement was expected to be minimal in GTA.

While most GTA municipalities provide some level of separate leaf and yard waste collection at curbside, a few may have to provide additional service to meet the requirements of the regulations. Leaf and yard waste collection service was assumed to increase in all regions to divert 60% of leaf and yard waste, or to maintain the existing rate, if greater than 60%.

Diversion through backyard composting was estimated using the number of backyard composters distributed in each Region at the end of 1992, and any additional backyard composters committed for distribution in the 1993 capital and operating budgets.

Recycling opportunities are provided to multi-family units at levels which vary throughout GTA municipalities. It was assumed that recycling collection service would increase to 100% of all multi-family households as a result of the 3Rs Regulations. It is assumed that all multi-family units recycled at 50% of the single family rate.

5.6 Diversion Estimates for Direct Cost System

The Direct Cost System evaluated for the GTA 3Rs Analysis would involve Blue Box and leaf and yard waste collection at no direct charge to the householder, with a charge of $1 per bag or tag for garbage disposal. This approach provides an economic incentive to increase waste diversion and source separation on a voluntary basis, without any change to the existing level of waste management services. Analysis of this system enables evaluation of the impacts of imposing an economic incentive to increase waste diversion without investing in additional recycling infrastructure. There is no consideration given by the service discipline to the potential of the Direct Cost System to generate revenues to finance any other municipal programs.

Schedule D of this Appendix presents data and case studies on existing Direct Cost systems. In general, the data from these programs show a significant decrease in waste disposal in communities after a Direct Cost system has been implemented. Reductions of 25% to 45% in disposed waste quantities have been reported (Skumatz, 1993). The impacts of additional

source reduction resulting from a Direct Cost System were not taken into consideration in developing diversion estimates.

The Direct Cost diversion estimates carried out for the GTA 3Rs analysis consider increased diversion through Blue Box, leaf and yard waste collection and backyard composting, but do not take additional reductions in disposed garbage (beyond those that can be explained by increased diversion activities) into consideration. This approach may somewhat underestimate diversion by the Direct Cost System and is considered conservative.

The following assumptions were used to estimate diversion resulting from implementation of a Direct Cost system in GTA Regions:

- Direct Cost would be imposed on the Existing/Committed waste management system, without any changes to the waste diversion system;
- Capture rates for the materials collected by the existing Blue Box system in each Region would increase to at least the levels measured in the Quinte Blue Box 2000 project, on a material by material basis (Quinte Regional Recycling, 1993). The capture rates used are presented in Table 5.2. The Quinte capture rates are considered a reasonable (possibly conservative) basis from which to estimate the potential impacts of a Direct Cost system on improved recovery of dry recyclables, as these recovery rates were achieved in an Ontario community without a Direct Cost System to provide an additional incentive to participate in recycling. A Direct Cost System has recently been imposed in Sydney Township, which is in Centre and South Hastings. Recovery data will be available at the end of 1994 at a very detailed material recovery level, and can be used to estimate the recovery of recyclables both before and after implementation of the Direct Cost System;
- Multi-family units would divert dry recyclables at the same rate as in the Existing/Committed System;
- Backyard composters would be used effectively by 72% of all single-family households (90% of the 80% of single-family households that accept units), with diversion at 169 kg/composter/yr;
- 50% of multi-family households would participate in on-site composting at a rate of 54 kg/yr per participating household;
- 90% of all leaf and yard waste (or the existing rate, if greater) would be diverted by single-family residents through backyard composting or source separation for curbside collection at no direct charge to the householder, based on studies in Seattle, Washington and other communities.

5.7 Diversion Estimates for Expanded Blue Box System

The Expanded Blue Box system incorporates three main features:

- a system that collects an expanded range of dry materials for recycling;
- aggressive promotion of backyard composting for management of wet wastes;
- a strong, community based promotion and education program.

Several studies were reviewed in developing assumptions related to the Expanded Blue Box system. These are described in Schedule E of this Appendix. Data from both Mississauga and Quinte were reviewed in detail, to identify capture rates which could be applied to GTA. The

Edmonton program achieved a higher total recovery per household than Quinte, but data were not available on a material-by-material basis required for this analysis. Quinte data were used in most cases, as these were available at a more detailed material by material level.

Diversion by the Expanded Blue Box System was estimated as follows:

- Dry materials collected include those collected in the Quinte Blue Box 2000 program, because markets are available for these materials at this time. The list can be expanded in the future as markets develop for other dry materials. The capture rates used to estimate recovery from single-family households for Expanded Blue Box materials are presented in Table 5.2;

- Multi-family units would divert dry recyclables at 50% of the single family capture rate;

- Backyard composters would be used effectively by 64% of all single-family households (80% of the 80% of single-family households that accept units), with diversion at 169 kg/composter/yr;

- Diversion of leaf and yard waste is based on the Existing/Committed System plus diversion through additional distributed backyard composters. A maximum diversion of 80% of leaf and yard waste through a combination of curbside collection and home composting is assumed. Where the existing rate of leaf and yard waste diversion is higher than 80%, the higher value has been used;

- 50% of multi-family households will participate in on-site composting at a rate of 54 kg/yr per participating household.

5.8 Diversion Estimates for Wet/Dry (Three-Stream) System

Several Ontario and Canadian municipalities have piloted two and three stream wet/dry collection systems. Schedule F of this Appendix summarizes available data on wet/dry programs.

In Ontario, the following municipalities have studied Wet/Dry collection:

- the City of Guelph;
- the City of Mississauga;
- the Region of Halton (Joshua Creek);
- Metro Toronto; and
- the City of St. Thomas.

On May 1, 1994, a pilot wet/dry program began in Markham, in the Region of York.

Three-stream wet/dry diversion rates assumed for GTA Regions were based on analysis of the latest information detailed in studies of the above programs, as well as the Lunenberg, Nova Scotia. The various studies show a range of achievable diversion rates from an average of 53% of yard waste and 37% of food waste (Mississauga) to 80% of food waste and more than 90% of yard waste (Guelph). Halton organics diversion of between 67% and 72% (depending on the backyard composter diversion rate assumed) resulted from a combination of backyard composting and other organic waste collection programs. Mississauga's low recovery rates resulted from low initial participation, although participation did increase in some pilot areas over the course of the study and it is believed that they might increase further over time. Wet/Dry projects are discussed in more detail in Schedule F of this Appendix.

Based on an analysis of the available data, the following assumptions were used to estimate diversion by the Wet/Dry System:

- diversion rates are assumed to be 80% for food waste and 90% for yard waste (achievable over time) through a combination of curbside collection and backyard composting. This is based on results from a three-stream cart-based pilot project in Guelph, Ontario;

- dry materials captured would include those collected in the Quinte Blue Box 2000 program. (The Guelph program collected the same dry materials that are collected in Quinte, plus wood and metals);

- capture rates for dry recyclables would increase to the levels measured (material by material) in Quinte. The rates fall within the range of recovery rates achieved in Halton and Guelph and have been sustained over time in Quinte. They are therefore considered applicable to a Wet/Dry system and potentially achievable combined with an aggressive promotion and education program;

- multi-family units would divert dry recyclables at 50% of the single family capture rate;

- backyard composters would be used effectively by 64% of all single-family households (80% of the 80% of single-family households that accept units), with diversion at 169 kg/composter/yr.;

- 50% of multi-family households would participate in on-site composting at a rate of 54 kg/yr per participating household.

5.9 Diversion Estimates for Mixed Waste Processing Systems

A number of mixed waste processing and composting operations are described in Schedule G of this Appendix. The Mixed Waste Processing System would maintain all source separation and waste diversion activities in the Existing/Committed System, with the addition of a mixed waste processing and composting facility. This facility would process the "third bag" of residential mixed waste that remains after recycling of dry materials (in the "first bag") and composting of leaf and yard wastes (in the "second bag"). This "third bag" is the one which is currently disposed as garbage. This System would also include the following elements:

- Backyard composters used effectively by 56% (70% of the 80% who would be provided composters) of all single-family households, with diversion at 169 kg/composter/yr.

- A Diversion rate of 80% (or the existing rate, if greater) was assumed for leaf and yard waste, through a combination of curbside collection of source separated material and backyard composting.

- 50% of multi-family households would participate in on-site composting at a rate of 54 kg/yr per participating household.

The estimated composition of "third bag" waste, which would enter the mixed waste processing and composting plant varies from region to region, has the following ranges:

• Newspaper	12 - 16%
• OCC	2 - 3%
• Mixed Paper	21 - 24%
• Glass	2 - 3%
• Steel	3 - 4%
• Aluminum	1%
• Mixed plastic	8 - 9%
• Organics	28 - 32%
• Other materials	14 - 17%

The following assumptions were used to estimate waste diversion through a mixed waste processing and composting facility added to process garbage from the Existing/Committed system in each Region:

- separation for refuse-derived fuel (RDF) for incineration was not considered;
- 30% of ONP and 10% of mixed paper going to the mixed waste plant are recovered for recycling. 85% of the remaining ONP and mixed paper is composted while 15% of the remainder of these materials ends up in the residue;
- 50% of OCC entering the mixed waste plant is recovered for recycling. 85% of the remaining OCC (42.5%) is composted while of the 15% of the remaining OCC (7.5%) ends up as residue. Telephone directories are assumed to have a similar recovery rate;
- 20% of glass entering the mixed waste plant is recovered for recycling. The remaining 80% of glass is landfilled;
- 70% of ferrous metal is recovered for recycling while the remaining 30% would be included in the residue stream. Some of the recovered ferrous metal would be extracted in the front end and the remainder would be recovered at other stages (through an electromagnet and hand sort);
- 50% of the non-ferrous metal is recovered for recycling (hand sort) while the remainder is landfilled;
- all PET entering the mixed waste plant is recovered for recycling;
- 25% of HDPE is recovered for recycling and the remainder becomes residue;
- all other plastics are disposed as residue. Some plastics are likely to be removed from the mixed waste processing stream at the front end of the process to minimize operational problems, but would be disposed with residue;
- all food and yard wastes that are not diverted by backyard composters or through the leaf and yard waste collection program would be sent for mixed waste composting. 90% of yard waste and 85% of the food waste entering the facility (in the "third bag") would be composted. The remainder would be disposed as residue;
- 50% of multi-family households would participate in backyard composting at a rate of 54 kg/hh/yr. with a total potential diversion of 10% of multi-family food waste;

- all wood arriving at the mixed waste processing and composting facility would be contaminated and non-recyclable. Larger items likely would be extracted with 10% of the remaining wood waste composted. The remainder would be landfilled;
- most C&D waste in this stream would likely be landfilled due to contamination and since it is not readily recoverable. 10% (mostly wood) is assumed to be composted and the remainder is assumed to be disposed as residue;
- 10% of textiles are recovered for recycling;
- all 'other' waste is sent to disposal;
- mass reduction of 50% results from the composting process (K. Thompson, 1993)
- if compost quality does not meet MOEE guidelines, it will be disposed. If compost quality meets MOEE guidelines, it will be marketed.

5.10 References

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6.0 REGION OF DURHAM RESIDENTIAL SYSTEM WASTE DIVERSION ESTIMATES

This chapter describes the six residential waste diversion systems and estimates of the diversion achievable by these systems as applied to the Region of Durham.

Table 6.1 presents the components of the six systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the estudy period (to accomodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

The diversion achieved by each system is summarized in Table 6.2.

Table 6.2
Estimated Residential Waste Diversion in Region of Durham in Year 2000

System	Estimated Diversion by Year 2000	
	No Source Reduction	Source Reduction
1–Existing	26%	29%
2–Existing/Committed	30%	33%
3–Direct Cost	43%	46%
4–Expanded Blue Box	44%	47%
5–Wet/Dry	56%	59%
6A – Mixed Waste Processing (Low Quality Compost)	60%	63%
6B – Mixed Waste Processing (High Quality Compost)	77%	80%

Two diversion values are presented for each system. The lower value is achievable by the year 2000 if no source reduction occurs. The higher value is achievable by the year 2000 if a 3 % level of source reduction is achieved. In all cases it is assumed that the system is fully operational and mature by the year 2000.

Table 6.3 presents the estimated tonnages of material diverted by each system (using 1992 data).

The housing mix impacts on the extent to which different diversion components are effective, as described in Chapter 5.0. The Region is expected to have predominantly single-family housing in the future. By the year 2000, housing in the Region is expected to consist of the following housing mix (HSA, 1994):

single-family detached households	126,086	(69% of total);
semi & low rise households	39,967	(22% of total);
high rise households	16,284	(9% of total);
Total Households (year 2000):	182,237.	

Table 6.1
Region of Durham
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • *Direct cost system for garbage collection* • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection** • *Curbside collection of residential waste from single family dwellings in three streams by specially designed trucks by municipal forces or contractors to municipalities* • *Collection of residential garbage from multi-family units in three streams by municipal forces or private contractors where feasible* • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Self haul of waste to landfills and transfer stations by residents	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads
Residential Recycling and Collection • Curbside collection of Blue Box materials from single family dwellings. Materials include ONP, OMG, telephone directories, OCC, PET, HDPE, glass, ferrous, aluminum. • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations* • *Curbside collection of additional dry materials* • *Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations)* • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • *Curbside collection of increased quantities of dry materials following implementation of Direct Cost system for garbage collection* • Recycling services at all multi-family buildings with 6 or more units. • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • *Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units* • *Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units* • *Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units*	**Residential Recycling and Collection** • *Provide carts to all single family households* • *Separation of waste into three streams (wet, dry, and garbage) by the householder* • *Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • Recycling services at all multi-family buildings with 6 or more units • *Large bins provided in the garbage management area of multi-family buildings. Residents will be encouraged to separate their waste into three separate bags*	**Residential Recycling and Collection** • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Curbside collection of additional dry materials • Recycling services at all multi-family buildings with 6 or more units • Collection of bins of recyclables from multi-family units

Table 6.1
Region of Durham
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Recycling Depots and Transfer Stations • Drop-off depots for multi-family residents not serviced by recycling • Drop-off depot for rural households. • Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) • Depots located at transfer stations to provide recycling opportunities to self-haul generators.	**Residential Recycling Depots and Transfer Stations** • Drop-off depots for multi-family residents not serviced by recycling • Drop-off depot for rural households • Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) • Depots located at transfer stations to provide recycling opportunities to self-haul generators.	**Residential Recycling Depots and Transfer Stations** • Drop-off depots for multi-family residents not serviced by recycling • Drop-off depot for rural households • Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) • Depots located at transfer stations to provide recycling opportunities to self-haul generators.	**Residential Recycling Depots and Transfer Stations** • *Drop-off depots for multi-family residents not serviced by recycling (collecting all Expanded Blue Box materials)* • *Drop-off depot for rural households (collecting all Expanded Bue Box materials)* • Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) • Depots located at transfer stations to provide recycling opportunities to self-haul generators.	**Residential Recycling Depots and Transfer Stations** • Drop-off depots for multi-family residents not serviced by recycling • Drop-off depot for rural households • Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) • Depots located at transfer stations to provide recycling opportunities to self-haul generators	**Residential Recycling Depots and Transfer Stations** • Drop-off depots for multi-family residents not serviced by recycling • Drop-off depot for rural households • Drop-off depots for recyclables (scrap metal, batteries, brush, drywall, HHW, tires, OCC and textiles) • Depots located at transfer stations to provide recycling opportunities to self-haul generators.
Residential Leaf and Yard Waste Collection • Seasonal curbside collection of leaf and yard waste. • Drop-off depots for leaf and yard waste	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Drop-off depots for leaf and yard waste	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste. • Drop-off depots for leaf and yard waste	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Drop-off depots for leaf and yard waste	**Residential Leaf and Yard Waste Collection** • *Collection of leaf and yard waste as part of three stream pick-up* • *Separate brush collection* • Drop-off depots for leaf and yard waste	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Drop-off depots for leaf and yard waste
Residential Household Composting • Backyard composter distribution programs (22,450 composters by end of 1992) • Limited community composting • Limited vermicomposting • 4,000 planned (cap budget)	**Residential Household Composting** • Backyard composter distribution programs (26,450 composters by end of 1992) • Limited community composting • Limited vermicomposting	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*

Table 6.1

Region of Durham

Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). • Special curbside collections of Christmas trees • Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations • Toxic Taxi service (discontinued in fall 1992)	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods , etc.)** • Special curbside collections of Christmas trees • Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collection of Christmas trees • Permanent drop-off depots for household hazardous waste (HHW) at Brock West Landfill, and Scugog and Oshawa transfer stations
Composting Facilities • Centralized windrow composting of leaf and yard waste.	**Composting Facilities** • Centralized windrow composting of leaf and yard waste	**Composting Facilities** • Centralized windrow composting of leaf and yard waste	**Composting Facilities** • Centralized windrow composting of leaf and yard waste	**Composting Facilities** • Existing centralized windrow leaf and yard waste composting facilities may be closed • *Central composting facility (in vessel) for composting of source separated household organics (wet stream) and leaf and yard waste*	**Composting Facilities** • Centralized windrow composting of leaf and yard waste • *New mixed waste processing and composting facility*
Reuse Centres and Activities • Goodwill trailers throughout region • Attended donation centre at Riston transfer station	**Reuse Centres and Activities** • Goodwill trailers throughout region • Attended donation centre at Riston transfer station	**Reuse Centres and Activities** • Goodwill trailers throughout region • Attended donation centre at Riston transfer station	**Reuse Centres and Activities** • Goodwill trailers throughout region • Attended donation centre at Riston transfer station	**Reuse Centres and Activities** • Goodwill trailers throughout region • Attended donation centre at Riston transfer station	**Reuse Centres and Activities** • Goodwill trailers throughout region • Attended donation centre at Riston transfer station
MRFs • One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff. • *Construct new MRF to handle 20-year requirements* • *Close existing MRF when new MRF constructed*	**MRFs** • One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff • Improvements/expansion to the existing regional MRF • *Construct new MRF to handle 20-year requirements* • *Close existing MRF when new MRF constructed*	**MRFs** • One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff • *Construct new MRF, to process larger stream of dry recyclables* • *Close existing MRF when new MRF constructed*	**MRFs** • One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff • *Construct new MRF, to process larger stream of dry recyclables* • *Close existing MRF when new MRF constructed*	**MRFs** • Processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/institutional) sector. Owned by the municipality and operated by municipal or contractors' staff. • *Construct new MRF, to process larger dry stream of recyclables* • *Close existing MRF when new MRF constructed*	**MRFs** • One processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/ institutional) sector. Owned by the municipality and operated by municipal staff • *Construct new MRF to process larger stream of dry recyclables* • *Close existing MRF when new MRF constructed*

Table 6.1
Region of Durham
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Promotion and Education • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc.	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc.	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling* • *Promotion/education program on direct cost system*	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling* • *Promotion/education program on Expanded Blue Box program*	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling* • *Promotion/education program for wet/dry system*	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector, including home composting video • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *3Rs promotion and education program, focused on source reduction, pre-cycling, reuse and recycling*

Table 6.3
Region of Durham
Residential System Diversion Estimates
1992

Component	Existing System Diversion (tonnes)	Existing/ Committed System Diversion (tonnes)	Direct Cost System Diversion (tonnes)	Expanded Blue Box System Diversion (tonnes)	Wet/Dry System Diversion (tonnes)	MSW plus E/C plus Composting (landfilled) (tonnes)	MSW plus E/C plus Composting (marketed) (tonnes)
Total Residential Waste (tonnes)	36,987	42,370	60,356	61,814	77,865	83,723	107,705
Paper							
Newspaper	12,531	12,972	17,605	18,014	18,014	19,330	22,495
Corrugated cardboard (OCC)	1,446	1,497	2,086	2,138	2,138	3,026	3,481
Telephone Directories	115	119	216	225	225	262	304
Mixed paper				2,784	2,784	10,512	18,845
Subtotal (Paper)	14,092	14,588	19,908	23,160	23,160	33,129	45,126
Glass	4,319	4,471	4,568	4,578	4,578	4,984	4,984
Tinplate Steel (ferrous)							
Aluminum (non-ferrous)							
Subtotal Metal (commingled)	3,177	3,289	3,739	3,751	3,751	5,438	5,438
Plastic							
PET	109	113	215	223	223	289	289
HDPE				261	261	123	123
Other Plastic				1,015	1,015	0	0
Subtotal (Plastic)	109	113	215	1,499	1,499	412	412
Organics							
Food wastes	2,580	3,040	10,493	9,390	23,443	18,216	28,146
Yard waste	9,259	13,419	17,983	15,985	17,983	17,584	19,545
Subtotal (Organics)	11,839	16,459	28,476	25,375	41,426	35,801	47,691
Wood Waste	621	621	621	621	621	646	672
Construction/Demolition Waste	752	752	752	752	752	821	890
Disposable Diapers			0	0	0	0	0
Textiles/Leather/Rubber	1,639	1,639	1,639	1,639	1,639	2,053	2,053
Other	439	439	439	439	439	439	439
Subtotal (Wood - Other)	3,451	3,451	3,451	3,451	3,451	3,959	4,054
TOTAL	**36,987**	**42,370**	**60,356**	**61,814**	**77,865**	**83,723**	**107,705**
Diversion Estimate =	**26%**	**30%**	**43%**	**44%**	**56%**	**60%**	**77%**

A full description of the methodology used to estimate residential waste diversion is described in Chapter 5.0. Features and results specific to the Region of Durham are discussed in this chapter.

6.1 System 1 - Existing

Information on residential waste diversion activities in the Region of Durham was obtained from the following sources:

- survey of regional and municipal staff in February-March, 1993 by the Study Team;
- on-going telephone communication with regional and municipal staff, and waste management contractors, February-July 1993;
- review of Regional reports to council.

In 1992, an estimated 140,078 tonnes of residential waste were generated in Durham. Of this, 36,987 tonnes were diverted and 103,091 tonnes disposed.

Residential recycling services in place as at December 31, 1992 consisted of the following activities:

- 101,576 single-family households were provided with bi-weekly curbside collection of Blue Box recyclables;
- 20,000 rural residences were served by depots and containers situated throughout the region (reported by OMMRI);
- 2,400 apartments were served by depots and containers (reported by OMMRI);
- Igloos and domes provided opportunities to recycle in public and rural areas;
- 22,450 backyard composters were owned by single-family households;
- extensive promotion and education programs;
- curbside pickup of leaf and yard waste in several municipalities;
- one Regional leaf and yard waste composting site;
- re-use activities by Goodwill Industries (clothes, durable goods, etc.);
- one attended donation centre at Ritson Transfer Station;
- two permanent HHW depots, including Brock West landfill (operated by Metro), Oshawa transfer station;
- The Toxic Taxi service was discontinued in the fall of 1992;
- one MRF (the Durham Recycling Centre) owned and operated by the Region.

Residential waste diversion was made up of activities that contributed to the following estimated diversion totals:

Blue Box curbside	17,166 tonnes
Dry Recyclables from depots	2,077 tonnes
Other Dry Recyclables diverted	5,905 tonnes
Leaf and yard waste	8,045 tonnes
Household wet waste through backyard composters	3,794 tonnes
Total diverted 1992	36,987 tonnes.

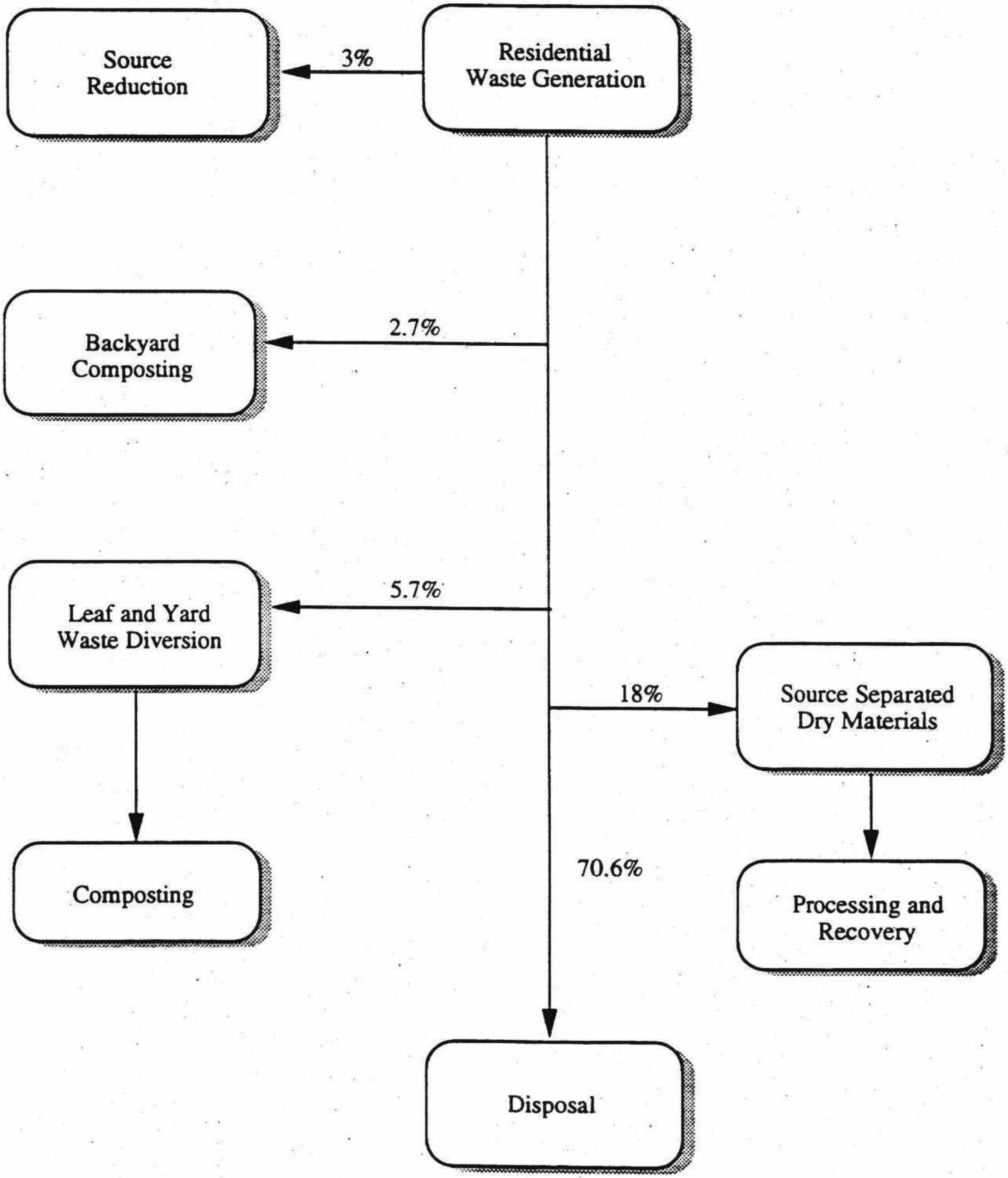
This information is summarized in Table 6.4. A schematic of waste flows for this system (projected to the year 2000) is presented in Figure 6.1. A more detailed description of diversion activities is presented in the text below. References for the information presented are contained in Section 6.7.

Table 6.4
Region of Durham
Summary of Existing Residential Waste Diversion System Performance
1992

Regional Characteristics	
Regional Population	421,014
Total Number of Households	140,831
— single-family detached	97,269
— high rise	11,275
— semi and low rise	32,287
Households served by curbside	101,576
Households served by depot	22,400
Number of backyard composters distributed	22,450
Residential Material Diverted in 1992	
Blue Box	17,166 tonnes
Depots (Blue Box materials)	2,077 tonnes
Depots (other materials)	5,905 tonnes
Leaf and yard waste collection and composting	8,045 tonnes
Diversion through backyard composters	3,794 tonnes
Total residential waste diverted	36,987 tonnes
Residential waste diversion summary	
Residential waste generated	140,078 tonnes
Residential waste diverted	36,987 tonnes
Residential waste disposed	103,091 tonnes
Residential waste diversion rate	26.4%

Sources: Social Environment Technical Appendix, May, 1994.
Region of Durham staff, 1993.
Durham municipal staff, 1993.

Figure 6.1
Region of Durham
Estimated Waste Flow
Residential System 1 — Existing



Residential Recycling and Collection[1]

In 1992, the 20,996 tonnes of materials were collected from (primarily) residential sources and were processed at the Region of Durham MRF. This included 1,140 tonnes of OCC, mixed paper and other recyclables from the IC&I sector. The quantities of each material processed at the MRF were:

- 12,377 tonnes of ONP and OMG (commingled);
- 1,411 tonnes of OCC;
- 115 tonnes of Telephone Directories;
- 2,443 tonnes of Aluminum and Steel (commingled);
- 4,211 tonnes of Glass;
- 155 tonnes of PET;
- 284 tonnes of fine paper (not colour separated, collected only from Region and Municipal offices and a few IC&I locations, that were discontinued by the end of 1993).

In February 1992, all 8 municipalities in the Region switched from weekly to bi-weekly collection of recyclables. On a Regional basis, this led to a slight reduction in gross recyclables collected (3.6%), however, some increases were noted in individual municipalities. For example, the City of Oshawa reported a 7.8% increase and the Town of Newcastle reported an 8.5% increase in the weight of materials collected curbside over 1991 (weekly) recovery levels. The switch to bi-weekly collection of recyclables resulted in an overall cost saving to the curbside collection program of 28% (RIS, 1993).

Residential Household Composting

Considerable research has been carried out on backyard composting programs in the Region of Durham (Compost Management Associates, 1990, 1992, 1992a, 1993).

An estimated 22,450 backyard composters had been distributed in Region of Durham by the end of 1992, which provided coverage to 18.7% of single-family households. To maintain the same coverage rate in the year 2000, an additional 6,600 backyard composters (for a total of 29,050 units) would be needed.

Residential Leaf and Yard Waste Collection/Composting Facilities

Leaf and yard waste collection programs were in place in five of Durham's municipalities (Ajax, Pickering, Oshawa, Clarington, and Whitby) in 1992.

In 1992, curbside collection of "green" waste in the Region of Durham totaled 7,331 tonnes. An additional 714 tonnes of leaf and yard waste were collected from transfer, depot and private sources in 1992, for a total of 8,045 tonnes.

Leaf and yard waste is processed in a composting facility that was constructed by the Durham Regional Works Department. The site is 10 acres in size, and is located next to the Regional MRF. Equipment used on-site includes 2 front end loaders, a SCAT machine, a tub grinder and a trommel screen. Staffing varies according to season, and ranges from 5 to 12

[1] Data were obtained from the local municipalities on the quantities of each material collected by curbside programs. These were somewhat different to the totals in the Region's 1992 Annual Report (Region of Durham Works Department, 1993). The latter source was used as the most comprehensive source of information. The information from the municipalities was valuable in assigning materials to different categories for waste composition estimates.

employees. Several modifications have been made to the composting site since 1989 by Ontario Disposal Ltd., Durham Region's composting contractor. Sale of the finished compost is the responsibility of the contractor. All compost finished in 1992 was sold although revenues for the material are not known.

Other Residential Waste Diversion

Reuse Activities: The Region received an MOEE grant of $22,500 to establish a series of Goodwill trailer sites in the region.

An "attended" donation centre is located at the Ritson Transfer Station. It accepts household materials such as batteries, concrete, OCC, old clothing, scrap metal and tires. A total of 93 tonnes of material were collected in 12 months of operation.

Household Hazardous Waste (HHW) Program: Durham residents have access to the household hazardous waste drop-off operated by Metro Toronto at the Brock West landfill site. A household hazardous waste sites is located at the Oshawa transfer stations. HHW collected from Oshawa is hauled away for further processing by Laidlaw environmental services.

The Toxic Taxi in Durham collected approximately 61 tonnes of HHW in 1992. This program was cancelled in the Fall of 1992 when the HHW drop-offs at transfer stations were opened and participation in the Toxic Taxi decreased. A total of 276 tonnes of HHW were collected from all sources in 1992.

Residential Promotion and Education

The Region of Durham has been actively involved in promotion and education on 3Rs topics. The Region assisted in publishing *A Household Guide to Waste Reduction and Recycling in Durham Region* in 1992 (Region of Durham Works 1992). The Region produced a video promoting home composting which will be aired on local cable stations. It also established an awards program aimed at recognizing significant diversion initiatives.

Material Recycling Facilities (MRFs)

The Region is served by one public MRF, the Durham Recycling Centre, which is owned and operated by the Region. This facility is 368 square metres in size. It processed approximately 21,000 tonnes of recyclable materials in 1992, from a combination of the residential and IC&I sectors. Residue and non-recyclables comprised 1.6% of the incoming material in 1992. The MRF was operated on a 3-shift basis, 24 hours/day, 5 days/week. It was operating at capacity in 1992. A total of 49 staff were employed at the MRF, with 45 staff in processing and another 4 in administration. A study of options to improve MRF operations was carried out in 1993 and some changes were made to operations in early 1994. Details were not available at the time of writing (May 1994).

It has been assumed that one new MRF, with capacity to process 38,500 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Existing System.

Diversion Achieved

Residential diversion by the Existing System was estimated to be 26.4% in 1992.

6.2 System 2 – Existing/Committed

In general, the Existing/Committed system includes:

- all facilities committed in the Region's most recent five year capital funding budgets (1993 to 1997 or 1994 to 1998 if available);
- provincial 3Rs regulations (described in Chapter 5.0); and
- any other policy commitments at the regional, provincial or federal level, which had been announced by the end of 1992.

The 1993 Capital and Operating Budgets and five year forecast for Waste Diversion indicated the following (Future Urban Research, 1994):

- $2,788,000 for the design and construction of an expansion to the Regional Recycling Centre;
- $702,000 for changes to programs related to the Recycling Centre and recycling programs, including extended hours of operation, additional staff, expansion of the Igloo program and deletion of the Toxic Taxi program;
- $365,900 for the sale of 4,000 home composters, the Pickering Compost Study and new community events programs (Future Urban Research, 1994).

The Region did not propose any new 3Rs programs in 1993, and is not proposing any within the next several years (Watson, 1993). Improvements to the existing Regional MRF in Whitby will likely improve processing efficiency, but the proposed collection programs are not likely to collect a significantly larger quantity of materials.

Distribution of an additional 4,000 backyard composters was planned for 1993, raising the total number of backyard composters available to 26,450, with a coverage of 21% of single-family households. An additional 6,700 backyard composters will be required to provide the same level of service (coverage to 21% of single-family households) in the year 2000.

It has been assumed that one new MRF, with capacity to process 40,000 tonnes/year of dry materials on 2 shift/day, 250 day/year basis, would be constructed to meet the 20 year needs of the Existing/Committed System.

Impacts of the 3Rs Regulations

Single Family Households
The Region of Durham consists of eight municipalities. Four of these have populations of greater than 50,000 (Oshawa, Ajax, Pickering, Whitby), while Clarington has a population of approximately 50,000, and the three remaining municipalities (Brock, Scugog and Uxbridge Townships) have populations between 5,000 and 50,000.

Under the Provincial 3Rs Regulations, all municipalities over 5,000 must:

- provide recycling services to parallel garbage collection service (curbside or depot);
- collect a list of "basic Blue Box" materials as well as two others; and
- provide backyard composting programs.

This level of service is currently in place, with the exception of some smaller communities. In general, the designated materials (ONP, aluminum, glass, steel and PET food and beverage containers) are already collected, in addition to OCC, OMG, HDPE and telephone directories. Minor additional quantities of dry materials are expected to be collected as a result of implementation of the 3Rs Regulations in small hamlets such as Whitevale. Whitevale is considered to be within the Town of Pickering and currently receives curbside collection of waste (but not recyclables). Whitevale will be required to provide curbside collection of recyclables under the new 3Rs Regulations (WRO, 1994).

All municipalities of greater than 50,000 (Oshawa, Ajax, Pickering, Whitby and Clarington) are also required to provide leaf and yard waste collection programs. These municipalities currently meet this requirement with collection of leaf and yard waste which is composted at the Regional compost site. Under the regulations, other municipalities between 5,000 and 50,000 that have leaf and yard waste collection programs are required to compost the material collected. It is assumed that all leaf and yard waste collected in the Region is composted at the regional site, therefore construction of additional leaf and yard waste composting facilities is not required.

Since the required levels of service are well established in most municipalities (with the exception of some smaller communities), the diversion impact of additional services that would result from implementing the 3Rs Regulations in Durham is expected to be minor.

Impacts of 3Rs Regulations on Recycling by Households in Multi-Family Buildings
The 3Rs Regulations require that owners of buildings containing six or more units in communities of greater than 5,000 provide source separation programs for collection by the municipalities. Some opportunities are currently available in the Region of Durham for recycling by multi-family households (approximately 2,400 apartments receive recycling service in the existing system). Implementation of the 3Rs Regulations is likely to increase recycling opportunities for multi-family households. The resulting diversion has been estimated assuming that 100% of multi-family households are provided with recycling opportunities (although the exact number of households in buildings containing 6 or more units is not known).

Impacts of Other Policy Commitments

The impacts of NAPP are incorporated into the diversion rates through source reduction estimates. The potential impacts of CIPSI have not been considered in the estimates.

Diversion Achieved

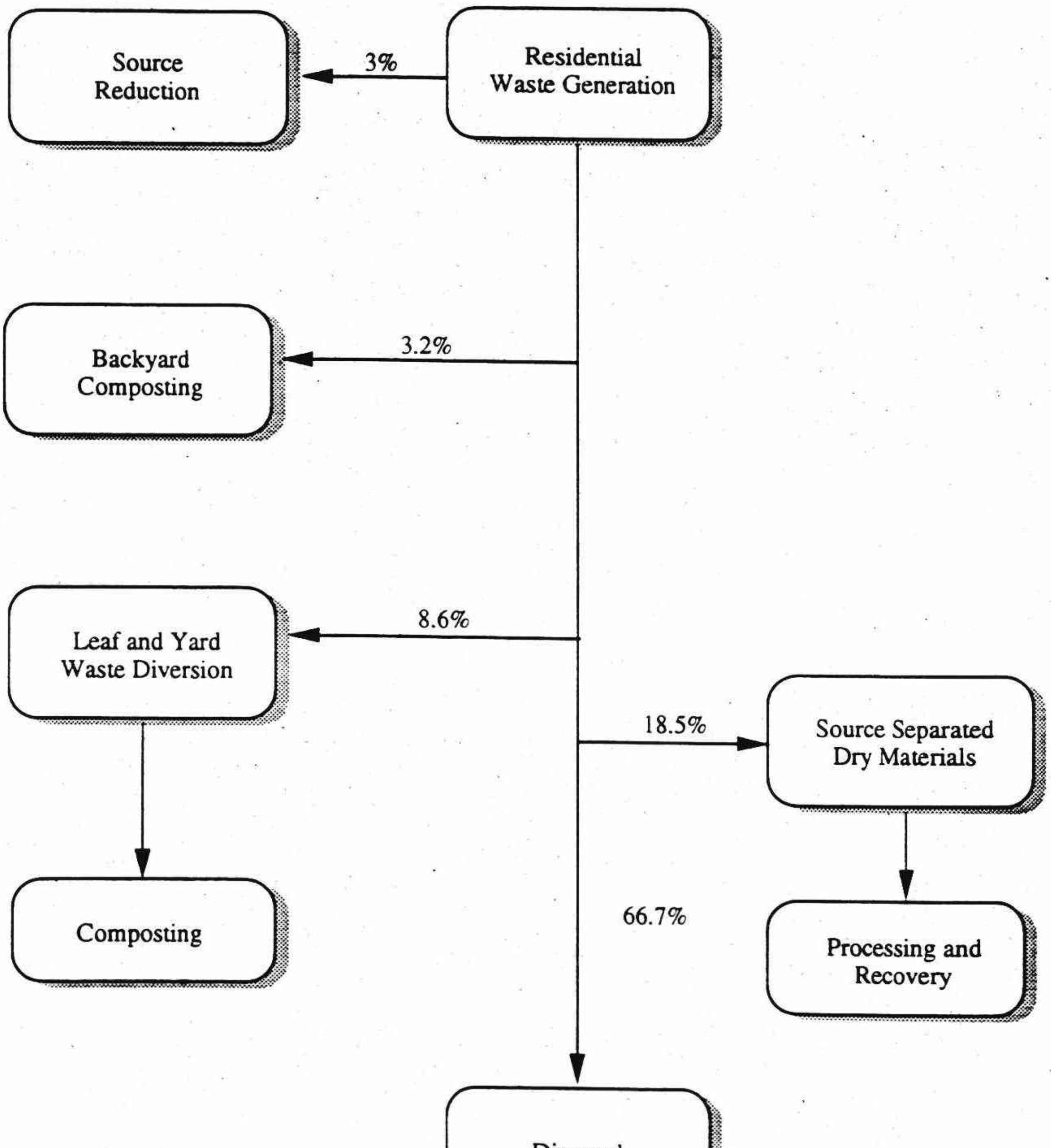
Diversion by the Existing/Committed system will not be significantly greater than that of the Existing System, and is estimated at 30% to 33% by the year 2000. Waste flow for the Existing/Committed system is shown schematically in Figure 6.2.

6.3 System 3 - Direct Cost

A Direct Cost system would charge a rate of $1 per bag or tag for garbage disposal by single-family households. Recyclables (Blue Box) and leaf and yard waste collection programs would be provided at no direct charge to the householder. This system provides an economic incentive for householders to divert more dry materials through the existing Blue Box system, more leaf and yard waste through backyard composting and separate curbside collection, and also to divert household food wastes through backyard composters.

The Direct Cost system would impact on the behaviour of 155,530 single-family households by the year 2000 (whose garbage is either disposed at the curb, or hauled to transfer stations).

Figure 6.2
Region of Durham
Estimated Waste Flow
Residential System 2 — Existing/Committed



Multi-family households would not be impacted, as their garbage is managed by building owners and the private sector.

The Direct Cost System requires collection of only the materials that are collected in the Region's Existing/Committed system and does not rely on the addition of more materials or services to increase diversion. It has been assumed that one new MRF, with capacity to process 51,600 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Direct Cost System.

Backyard composters would be distributed to 80% of single-family households (124,425 households) by the year 2000. It is assumed that because of the strong economic incentive to do so, up to 90% of these backyard composters would be used effectively to divert an average of 169 kg/composter/year. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

On the basis of the assumptions presented in Section 5.8, diversion by the Direct Cost system is estimated at 43% to 46% by the year 2000. Waste flow for the Direct Cost system is shown schematically in Figure 6.3.

6.4 System 4 – Expanded Blue Box

The Existing/Committed System in the Region of Durham collects:

- ONP and OMG (commingled);
- OCC;
- Telephone Directories;
- Aluminum and steel (commingled);
- Glass;
- PET;
- HDPE.

The Expanded Blue Box System would therefore require municipalities to collect the following additional materials:

- boxboard;
- polycoat (e.g. milk cartons);
- other rigid plastic bottles & tubes (PVC, PP, LDPE);
- film plastic (LDPE);
- foam plastic and rigid trays (PS);
- textiles;
- mixed paper.

In addition, backyard composters would be distributed to a total of 124,425 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year.

Multi-family households would divert dry materials at 50% of the rate of single-family households. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

It has been assumed that one new MRF, with capacity to process 60,400 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Expanded Blue Box System.

Diversion by the Expanded Blue Box system is estimated at 44% to 47% by the year 2000. Waste flow for the Expanded Blue Box system is shown schematically in Figure 6.4.

Figure 6.3
Region of Durham
Estimated Waste Flow
Residential System 3 — Direct Cost

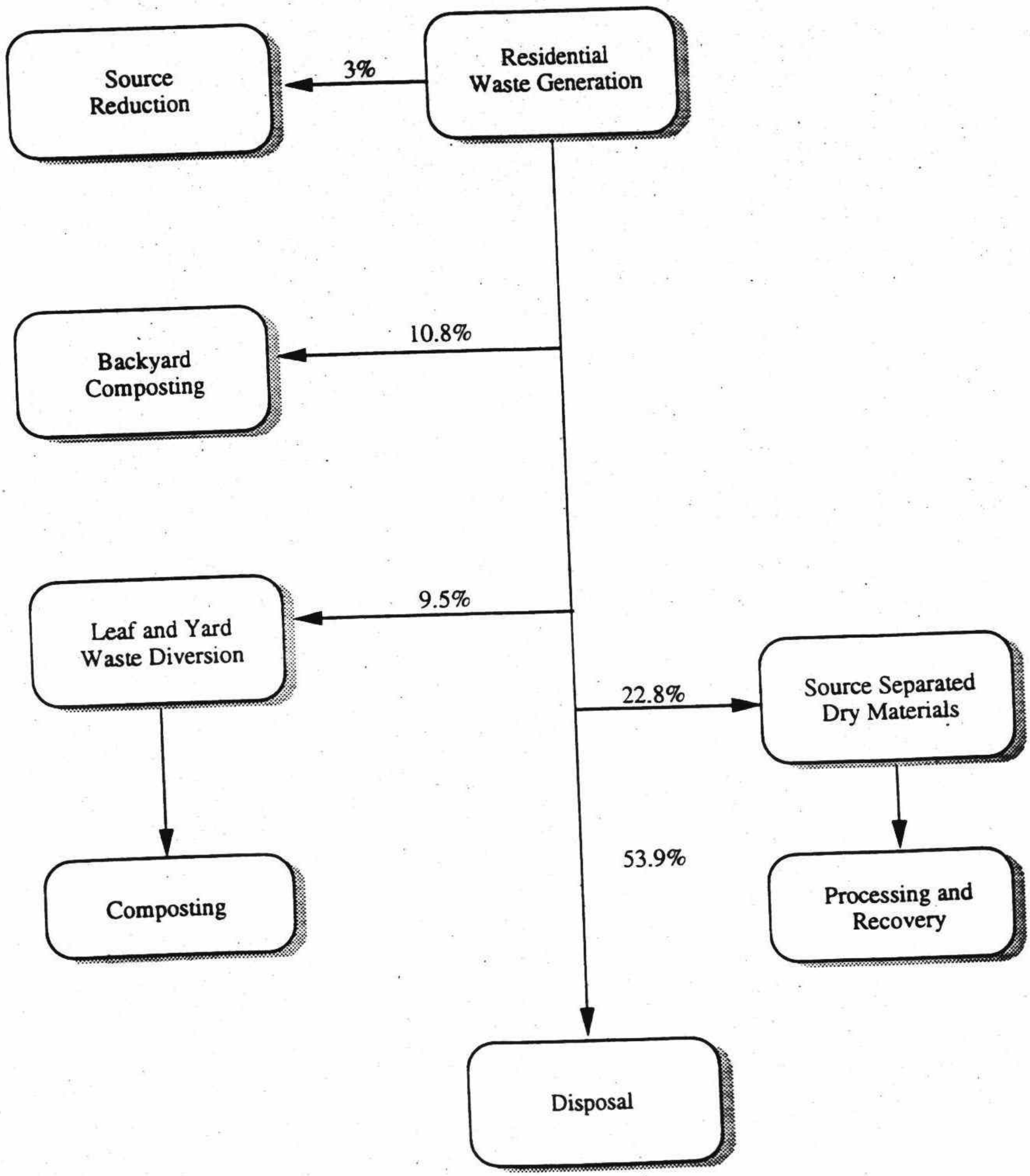
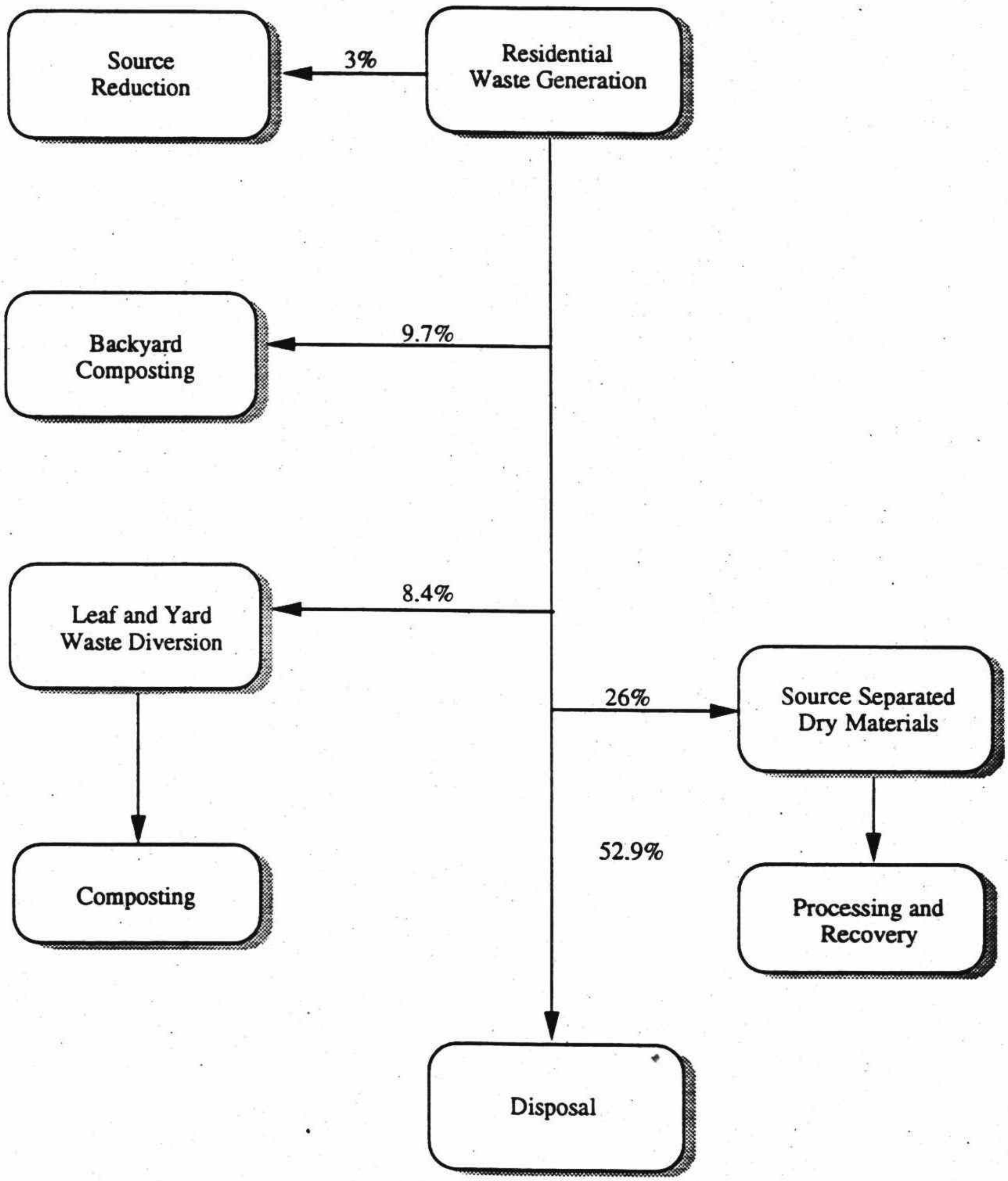


Figure 6.4
Region of Durham
Estimated Waste Flow
Residential System 4 — Expanded Blue Box



6.5 System 5 - Wet/Dry

A three stream wet/dry system would serve all single-family homes in the Region (155,530 single-family households by the year 2000). Some multi-family units would also be served with wet/dry collection, depending on space availability in the buildings and on building owners' willingness to participate in the program. Multi-family units would be assumed to divert wet and dry materials at 50% of the rate of single family households.

Backyard composters would be distributed to a total of 124,425 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year.

A central in-vessel composting facility with a design capacity of 67,000 tonnes/year would be required to process collected household wet waste. It has been assumed that one new MRF, with capacity to process 60,400 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Wet/Dry System.

Diversion by the Wet/Dry system is estimated at 56% to 59% by the year 2000. Waste flow for the Wet/Dry system as shown schematically in Figure 6.5.

6.6 System 6 - Mixed Waste Processing and Composting

The Mixed Waste Processing and composting system builds on the Existing/Committed system, and processes the "third bag" of garbage (which remains after Blue Box recycling, leaf and yard waste collection and backyard composting). Some additional dry recyclables are removed and processed at the front end of the mixed waste processing and composting plant, and the remaining mixed waste stream is composted. Finished compost which meets MOEE guidelines would be marketed, but in a worst case scenario (where compost quality does not meet MOEE guidelines), it may require disposal in landfill. In either scenario, considerable mass reduction occurs in the composting process which results in a reduction of the tonnage leaving the mixed waste composting plant.

Backyard composters would be distributed to a total of 124,425 single-family households by the year 2000. It is assumed that 70% of these composters would be used effectively diverting 169 kg/composter/year.

A mixed waste processing and composting plant with a design capacity of 176,000 tonnes/year would be required. In addition, it has been assumed that one new MRF, with capacity to process 40,000 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Mixed Waste Processing System.

Multi-family households would be assumed to divert dry materials at 50% the rate of single family households. In addition, an allowance for diversion of up to 54 kg/household/year by participating multi-family households (up to 50% of the total) through community/on-site composting activities has also been assumed. The mixed waste processing and composting plant can divert both wet and dry materials generated by multi-family households. These streams are not easily recovered in the other systems considered.

Diversion, by the year 2000, by the Mixed Waste Processing and composting system is estimated at:

60% to 63% if compost quality does not meet MOEE standards, and
77% to 80% if compost quality meets MOEE standards.

Waste flow for the mixed waste processing system is shown schematically in Figure 6.6.

Figure 6.5
Region of Durham
Estimated Waste Flow
Residential System 5 — Wet/Dry

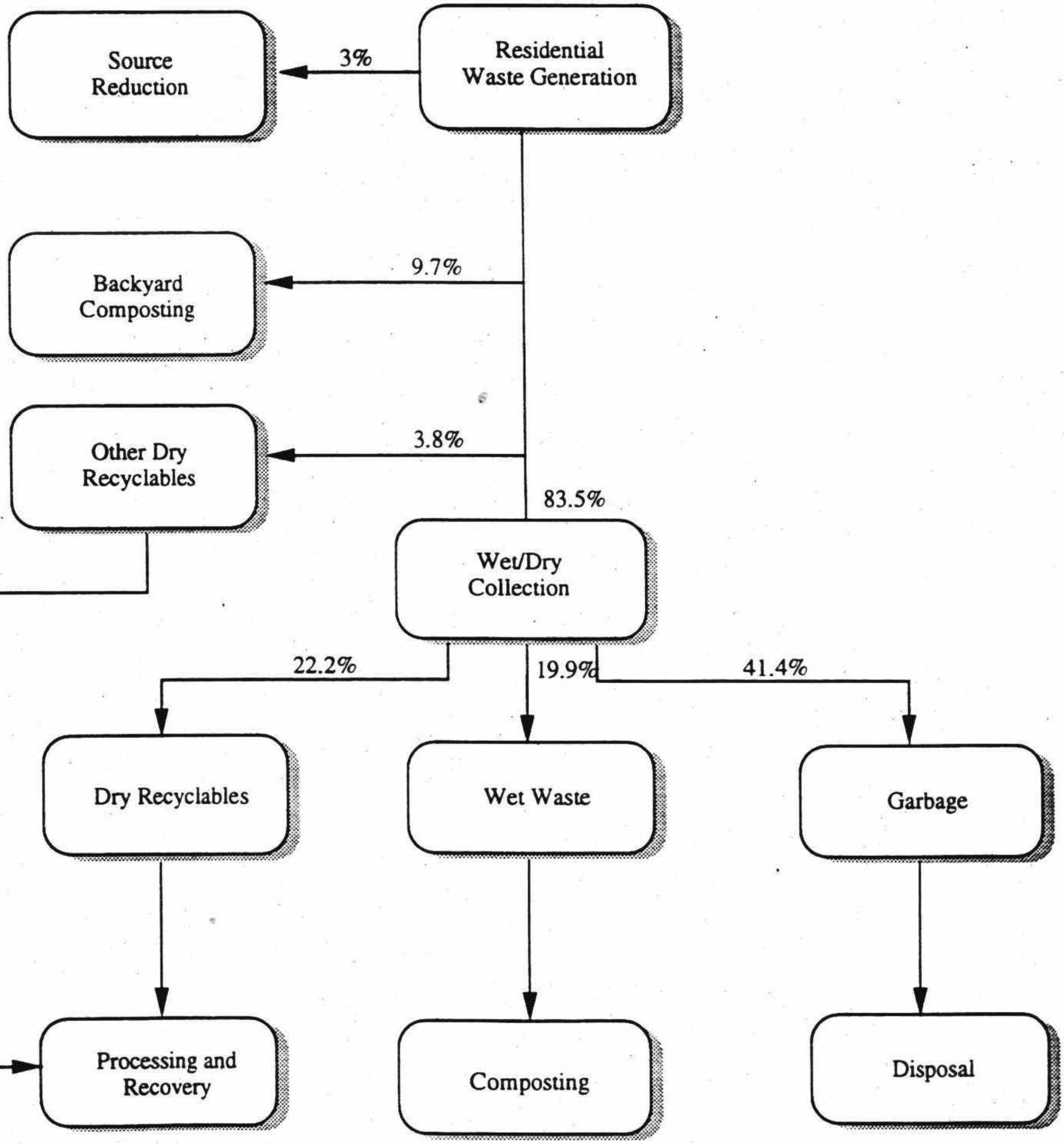
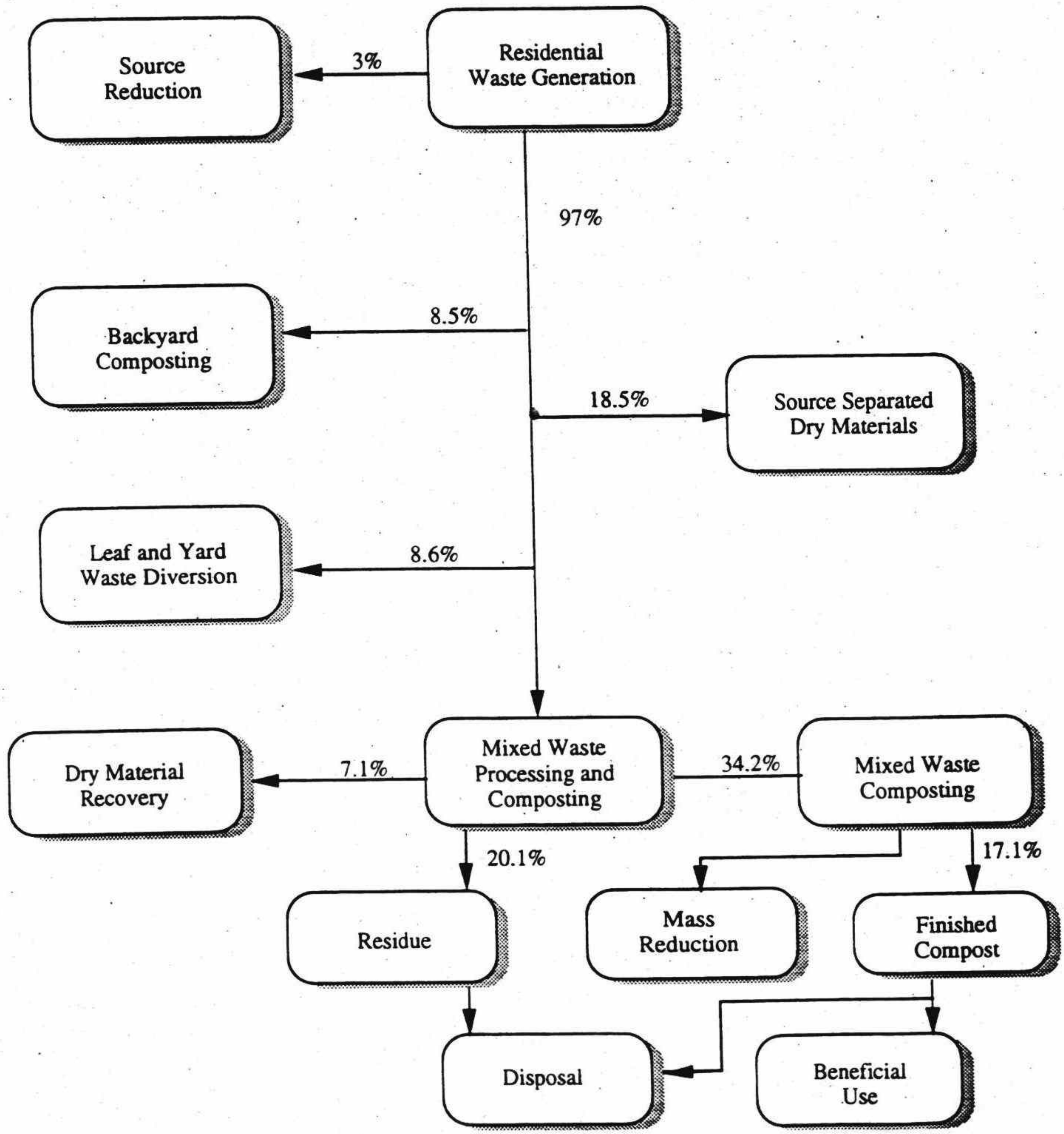


Figure 6.6
Region of Durham
Estimated Waste Flow
Residential System 6 — Mixed Waste Processing



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7.0 METROPOLITAN TORONTO RESIDENTIAL SYSTEM DIVERSION ESTIMATES

7.0 METROPOLITAN TORONTO RESIDENTIAL SYSTEM DIVERSION ESTIMATES

This chapter describes the six residential waste diversion systems and estimates of the diversion achievable by these systems as applied to Metro Toronto.

Table 7.1 presents the components of the six systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the estudy period (to accomodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

The diversion achieved by each system is summarized in Table 7.2.

Table 7.2
Estimated Residential Waste Diversion in Metro Toronto in Year 2000

System	Estimated Diversion by Year 2000	
	No Source Reduction	Source Reduction
1–Existing	19%	22%
2–Existing/Committed	21%	24%
3–Direct Cost	29%	32%
4–Expanded Blue Box	33%	36%
5–Wet/Dry	44%	47%
6A–Mixed Waste Processing (Low Quality Compost)	52%	55%
6B–Mixed Waste Processing (High Quality Compost)	72%	75%

Two diversion values are presented for each system. The lower value is achievable by the year 2000 if no source reduction occurs. The higher value is achievable by the year 2000 if a 3% level of source reduction is achieved. In all cases it is assumed that the system is fully operational and mature by the year 2000.

Table 7.3 presents the estimated tonnages of material diverted by each system (using 1992 data).

Metro Toronto has, and will continue to have a significant concentration of multi-family housing in the future. By the year 2000, housing in Metro is expected to consist of the following:

single-family detached households	302,259	(32% of total)
semi & low rise households	295,775	(31% of total)
high rise households	358,683	(37% of total)
Total Households (year 2000):	956,717.	

Table 7.1
Metro Toronto
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by municipal forces or private contractors • Self-haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self-haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by municipal forces or private contractors. • *Direct cost system for garbage collection from households currently serviced by municipal forces* • Self-haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self-haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • *Curbside collection of residential waste from single family dwellings in three streams by specially designed trucks* • *Collection of residential garbage from multi-family units in three streams by municipal forces or private contractors, where feasible* • Self-haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self-haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads
Residential Recycling and Collection • Curbside collection of Blue Box materials from single family dwellings and some apartment buildings. Typical materials include ONP, OCC, telephone directories, magazines, PET, HDPE, glass, ferrous, aluminum • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations* • *Curbside collection of additional dry materials* • *Recycling services at all multi-family buildings with 6 or more units (3R's Regulations)* • Collection of bins of recyclables from multi-family units • *Some additonal recycling service to multi-family units*	**Residential Recycling and Collection** • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Curbside collection of additional dry materials • Recycling services at all multi-family buildings with 6 or more units • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • *Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units* • *Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units* • *Collection of bins of recyclables (collecting all expanded blue box materials) from multi-family units.*	**Residential Recycling and Collection** • *Provide carts to all single family households.* • *Separation of waste into three streams (wet, dry and garbage) by the householder.* • *Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • Recycling services at all multi-family buildings with 6 or more units • *Large bins provided in the garbage management area of multi-family buildings, where space permits. Residents will be encouraged to separate their waste into three separate bags*	**Residential Recycling and Collection** • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Curbside collection of additional dry materials • Recycling services at all multi-family buildings with 6 or more units • Collection of bins of recyclables from multi-family units • Some additional recycling service to multi-family units

Table 7.1
Metro Toronto
Residential System Components

System 1: Existing	**System 2: Existing/Committed**	**System 3: Direct Cost**	**System 4: Expanded Blue Box**	**System 5: Wet/Dry**	**System 6: Mixed Waste Processing**
Residential Recycling Depots and Transfer Stations • Drop-off depot for dry recyclables (including all banned materials) at landfills • Depots located at transfer stations to provide recycling opportunities to self-haul generators • Igloos and domes provide opportunities to recycle in public areas • Drop-off depots for multi-family residents not serviced by recycling • Depots for voluntary recycling by residents (e.g.Scarborough)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at landfills • Depots located at transfer stations to provide recycling opportunities to self-haul generators • Igloos and domes provide opportunities to recycle in public areas • Drop-off depots for multi-family residents not serviced by recycling • Depots for voluntary recycling by residents (e.g.Scarborough)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at landfills • Depots located at transfer stations to provide recycling opportunities to self-haul generators • Igloos and domes provide opportunities to recycle in public areas • Drop-off depots for multi-family residents not serviced by recycling • Depots for voluntary recycling by residents (e.g.Scarborough)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at landfills • Depots located at transfer stations to provide recycling opportunities to self-haul generators *(collecting all Expanded Blue Box materials)* • Igloos and domes provide opportunities to recycle in public areas • *Drop-off depots for multi-family residents not serviced by recycling. for full range of Expanded Blue Box materials.* • Depots for voluntary recycling by residents (e.g.Scarborough)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at landfills • Depots located at transfer stations to provide recycling opportunities to self-haul generators *(collecting all Expanded Blue Box materials)* • Igloos and domes provide opportunities to recycle in public areas • Drop-off depots for multi--family residents not serviced by recycling • Depots for voluntary recycling by residents (e.g.Scarborough)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at landfills • Depots located at transfer stations to provide recycling opportunities to self-haul generators • Igloos and domes provide opportunities to recycle in public areas • Drop-off depots for multi-family residents not serviced by recycling • Depots for voluntary recycling by residents (e.g.Scarborough)
Residential Leaf and Yard Waste Collection • Seasonal curbside collection of leaf and yard waste	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • *New leaf and yard waste bunkers at transfer stations (1994 capital budget)*	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • New leaf and yard waste bunkers at transfer stations (1994 capital budget)	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • New leaf and yard waste bunkers at transfer stations (1994 capital budget)	**Residential Leaf and Yard Waste Collection** • *Collection of leaf and yard waste as part of three stream pick-up* • *Separate brush collectiom* • New leaf and yard waste bunkers at transfer stations (1994 capital budget)	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste. • New leaf and yard waste bunkers at transfer stations (1994 capital budget)
Residential Household Composting • Backyard composter distribution programs (105,000 units to date) • Sale of 3-bin units to some multi-family dwellings at $150 each (25 units by end of 1992) • Limited community composting • Limited vermicomposting	**Residential Household Composting** • Backyard composter distribution programs (105,000 units to date) • *Distribution of an additional 15,000 to 20,000 backyard composters, to bring the total distributed by Metro to between 120,000 and 125,000.* • Sale of 3-bin units to some multi-family dwellings at $150 each (25 units by end of 1992) • Additional community composting • Additional vermicomposting	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes on a voluntary basis.* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes.* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*

Table 7.1
Metro Toronto
Residential System Components

System 1: Existing	**System 2: Existing/Committed**	**System 3: Direct Cost**	**System 4: Expanded Blue Box**	**System 5: Wet/Dry**	**System 6: Mixed Waste Processing**
Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). • Special curbside collections of Christmas trees • Curbside collection of white goods • Drop-off depots for white goods • Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) • Two Toxic Taxis	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods • Drop-off depots for white goods • Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) • Two Toxic Taxis	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods • Drop-off depots for white goods • Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) • Two Toxic Taxis	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods • Drop-off depots for white goods • Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) • Two Toxic Taxis	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods • Drop-off depots for white goods • Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) • Two Toxic Taxis	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods, etc.)** • Special curbside collections of Christmas trees • Curbside collection of white goods • Drop-off depots for white goods • Ten (10) permanent drop-off depots for HHW (8 in Metro, 1 at Keele Valley Landfill, one at Brock Road West landfill.) • Two Toxic Taxis
Composting Facilities • Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site)	**Composting Facilities** • Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site).	**Composting Facilities** • Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site).	**Composting Facilities** • Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site).	**Composting Facilities** • Existing centralized windrow leaf and yard waste composting facilities may be closed • *One new central composting facility (in-vessel) with a capacity to process all household organics and leaf and yard wastes*	**Composting Facilities** • Centralized windrow composting of leaf and yard waste in North York (3 sites), Scarborough (1 site), Etobicoke (1 site), and at Keele Valley (Metro operated Avondale Site). • *Two new mixed waste processing and composting facilities*
Reuse Centres and Activities • Goods exchange days • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). • Food reuse organization (such as Second Harvest). • Re-Uze Centre in Scarborough	**Reuse Centres and Activities** • Goods exchange days • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). • Food reuse organization (such as Second Harvest). • Re-Uze Centre in Scarborough	**Reuse Centres and Activities** • Goods exchange days • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). • Food reuse organization (such as Second Harvest). • Re-Uze Centre in Scarborough	**Reuse Centres and Activities** • Goods exchange days • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) • Food reuse organization (such as Second Harvest). • Re-Uze Centre in Scarborough	**Reuse Centres and Activities** • Goods exchange days • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). • Food reuse organization (such as Second Harvest). • Re-Uze Centre in Scarborough	**Reuse Centres and Activities** • Goods exchange days • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.). • Food reuse organization (such as Second Harvest). • Re-Uze Centre in Scarborough

Table 7.1
Metro Toronto
Residential System Components

System 1: Existing	**System 2: Existing/Committed**	**System 3: Direct Cost**	**System 4: Expanded Blue Box**	**System 5: Wet/Dry**	**System 6: Mixed Waste Processing**
MRFs • QUNO MRF on Commissioners Street, which processed fibres and container materials under contract to Metro in 1992. Operation changed in 1993 to process fibres only • CRInc MRF on Commissioners Street, which started operation in May 1992. It processes only container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRInc • Dufferin Street MRF is owned by Metro and operated by QUNO • *One new MRF (to meet 20 year requirement)*	**MRFs** • QUNO MRF on Commissioners Street, which processes fibres • CRInc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRInc. • Dufferin Street MRF is owned by Metro and operated by QUNO • *One new MRF for processing dry recyclables to meet 20 year requirements*	**MRFs** • QUNO MRF on Commissioners Street, which processes fibres • CRInc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRInc. • Dufferin Street MRF is owned by Metro and operated by QUNO • *One new MRF for processing dry recyclables (to meet 20 year requirement)*	**MRFs** • QUNO MRF on Commissioners Street, which processes fibres • CRInc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRInc. • Dufferin Street MRF is owned by Metro and operated by QUNO • *One new MRF for processing dry recyclables (to meet 20 year requirement)*	**MRFs** • QUNO MRF on Commissioners Street, which processes fibres • CRInc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRInc. • Dufferin Street MRF is owned by Metro and operated by QUNO • *One new MRF for processing dry recyclables (to meet 20 year requirement)*	**MRFs** • QUNO MRF on Commissioners Street, which processes fibres • CRInc MRF on Commissioners Street processes container materials (plastic, metals, and glass). The facility is owned by Metro, and is operated under contract by CRInc. • Dufferin Street MRF is owned by Metro and operated by QUNO • *One new MRF for processing dry recyclables (to meet 20 year requirement)*
Residential Promotion and Education • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc.	**Residential Promotion and Education** • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc.	**Residential Promotion and Education** • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *Promotion/education on Direct cost program* • *Promotion/education program on source reduction, pre-cycling, composting reuse and recycling*	**Residential Promotion and Education** • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *Promotion/education on Expanded Blue Box program.* • *Promotion/education program on source reduction, pre-cycling, composting reuse and recycling*	**Residential Promotion and Education** • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *Promotion/education for wet/dry system* • *Promotion/education for source reduction, pre-cycling, composting, reuse and recycling.*	**Residential Promotion and Education** • Extensive promotion and education campaign on composting by the residential sector, which includes the Master Composter program operated for Metro by RCO, a compost information hotline, radio and newspaper advertisements, and backyard composting manuals in many languages • Extensive 3Rs promotion and education program, focused on the residential sector, which includes publishing "Your Guide to Reduction and Recycling in Metropolitan Toronto" • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc. • *Promotion/education for source reduction, pre-cycling, composting, reuse and recycling*

Table 7.3
Metropolitan Toronto
Residential System Diversion Estimates
1992

Component	Existing System Diversion (tonnes)	Existing/ Committed Diversion (tonnes)	Direct Cost System Diversion (tonnes)	Expanded Blue Box Diversion (tonnes)	Wet/Dry System Diversion (tonnes)	MSW (compost landfilled) (tonnes)	MSW (compost marketed) (tonnes)
Total Residential Waste (tonnes)	201,177	221,854	313,733	351,864	468,530	561,096	771,485
Paper							
Newspaper	57,995	63,951	101,220	119,207	119,207	140,205	178,172
Corrugated cardboard (OCC)	2,786	3,040	10,543	14,148	14,148	21,929	27,563
Telephone Directories	1,098	1,212	1,627	1,824	1,824	2,611	3,029
Mixed paper		3,500	3,500	18,359	18,359	86,813	152,858
Subtotal (Paper)	61,879	71,703	116,890	153,539	153,539	251,558	361,622
Glass	23,789	26,183	28,932	30,294	30,294	32,359	32,359
Tinplate Steel (ferrous)	18,314	19,981	20,520	20,019	20,019	34,182	34,182
Aluminum (non-ferrous)	387	422	2,482	3,471	3,471	5,816	5,816
Plastic							
PET	635	697	1,224	1,479	1,479	2,348	2,348
HDPE	1,141	1,252	1,570	1,724	1,724	1,934	1,934
Other Plastic		0	0	6,715	6,715	0	0
Subtotal (Plastic)	1,776	1,949	2,794	9,918	9,918	4,281	4,281
Organics							
Food wastes	12,067	14,078	48,580	44,465	155,135	132,336	224,323
Yard waste	76,740	81,425	87,421	81,425	87,421	88,494	95,563
Subtotal (Organics)	88,807	95,503	136,001	125,889	242,555	220,830	319,886
Wood Waste						459	917
Construction/Demolition Waste	1,500	1,122	1,122	1,122	1,122	1,932	2,742
Disposable Diapers						0	0
Textiles/Leather/Rubber				2,619	2,619	4,687	4,687
Other	4,725	4,992	4,992	4,992	4,992	4,992	4,992
Subtotal (Wood - Other)	6,225	6,114	6,114	8,733	8,733	12,070	13,339
TOTAL	**201,177**	**221,854**	**313,733**	**351,864**	**468,530**	**561,096**	**771,485**
Diversion Estimate =	**19%**	**21%**	**29%**	**33%**	**44%**	**52%**	**72%**

The housing mix impacts on the extent to which different diversion components are effective, as described in Chapter 5.0. This impact is more pronounced in Metro Toronto than in other Regions because it has the highest level of multi-family households (48.6% of total households when low rise households are included). Systems 3, 4 and 5 in Metro do not lead to the same increased levels of potential diversion that are seen in other Regions because they rely on increased diversion from components that are most applicable to single-family households (e.g. behavioural changes due to direct costs applied to waste disposal). These differences are highlighted in the system descriptions below.

A full description of the methodology used to estimate residential waste diversion is described in Chapter 5.0. Features and results specific to the Metro Toronto are discussed in this chapter.

7.1 System 1 - Existing

Information on residential waste diversion activities was obtained from the following sources including:

- survey of regional and municipal staff, February-March 1993;
- on-going discussions with regional and municipal staff, February-October, 1993;
- miscellaneous reports to council, internal memoranda, etc. which are referenced at the end of this chapter.

In 1992, an estimated 1,069,790 tonnes of residential waste were generated in Metropolitan Toronto. Of this, 201,177 tonnes were diverted and 868,613 tonnes disposed. Residential recycling services in place as at December 31, 1992 consisted of the following:

- residential curbside recycling services to 704,000 households;
- igloos and domes in public areas;
- 105,000 backyard composters;
- 25 large 3-bin composting units for apartments and cooperative housing complexes;
- recycling service to approximately 65% of units in multi-family buildings;
- 6 leaf and yard waste composting facilities operated by Metro or municipalities;
- 3 MRFs processing containers and fibres;
- Goodwill Industries operates 10 "Attended Donation Centres," 20 stores for donating clothing and small items and a training facility for repairing mattresses, furniture, small engines etc.;
- ReUze Center in Scarborough;
- Second Harvest acts as a broker between sources of surplus perishable food and social service organizations;
- ten permanent HHW depots operated for 2 days per week;
- two Toxic Taxis operated 6 days per week;
- curbside collection of white goods in East York, Etobicoke and York;
- drop-off depot for white goods in Etobicoke;
- pilot wet collection program;
- extensive advertising, education and promotion, including a general information hotline operated by Metro;
- landfill bans on OCC, office paper, tires, drywall, scrap metal, surplus goods, off-specification goods, excavated material and wood.

Residential waste diversion was made up of activities that contributed to the following estimated totals:

Blue Box curbside	99,671 tonnes
Dry Recyclables from depots	2,611 tonnes
Large appliances/scrap metal (other)	9,413 tonnes
Leaf and yard waste	71,062 tonnes
Household wet waste through backyard composters	17,745 tonnes
Household Hazardous Waste	675 tonnes
Total diverted 1992	201,177 tonnes

This information is summarized in Table 7.4, and is presented schematically in Figure 7.1. A more detailed description of diversion activities is presented in the text below. References for the information presented are contained in Section 7.7.

Residential Recycling and Collection

In 1992 approximately 112,370 tonnes were collected from the Blue Box programs and depots operating in all of the municipalities in Metropolitan Toronto in 1992 including:

- 57,995 tonnes of ONP and OMG (commingled);
- 2,786 tonnes of OCC;
- 1,098 tonnes of Telephone Directories;
- 23,789 tonnes of Glass;
- 18,314 tonnes of Steel (including scrap metal and white goods);
- 387 tonnes of Aluminum;
- 635 tonnes of PET;
- 1,141 tonnes of HDPE;
- 5,550 tonnes of Metal, Wood, Tires, Textiles etc.;
- 675 tonnes HHW.

All municipalities offered residents weekly curbside pickup, except the City of Toronto which operated a unique program that collected paper and container material on alternate weeks.

Residential Household Composting

An estimated 105,000 backyard composters had been distributed in Metro Toronto by the end of 1992, providing a coverage rate of 23% of single-family households.

To address the composting needs of residents of multi-residential dwellings in the area, community composting activities are now being promoted by Metro. Large 3-bin units are available to apartment and co-operative housing complexes for $150 each. By the end of 1992, 25 of these units were in use (Ferguson, 1993). The Recycling Council of Ontario has also been involved in a demonstration project on multi-family composting (RCO, 1993).

To maintain a coverage rate of 23% in the year 2000, an additional 9,800 backyard composters (to a total of 114,800) would be needed.

Residential Leaf and Yard Waste Collection/Composting Facilities

All Metro Toronto municipalities provide curbside collection of leaf and yard wastes. In 1992, collection of green waste in Metropolitan Toronto totaled 71,062 tonnes.

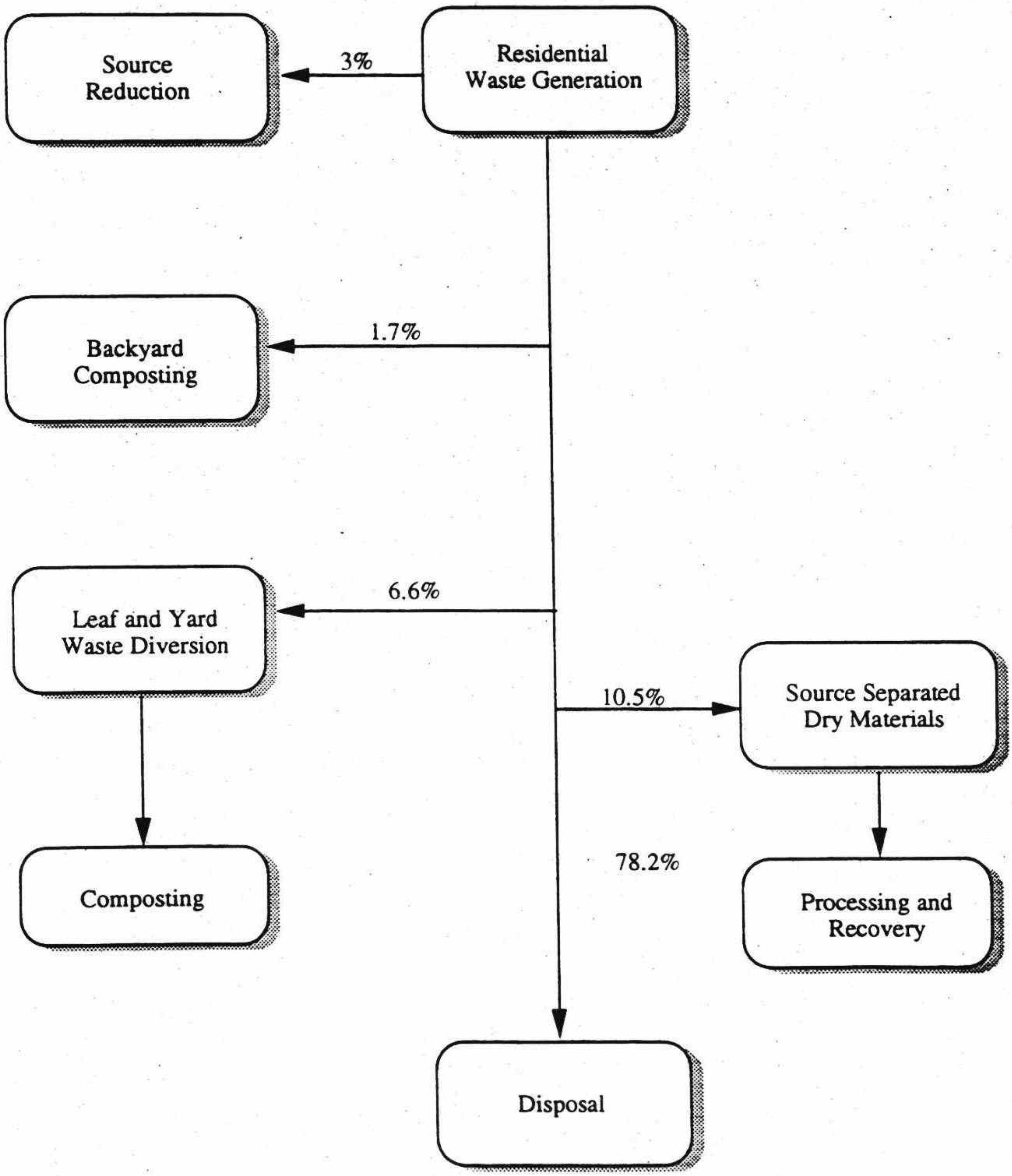
Leaf and yard waste collected in Metro Toronto municipalities is processed in 6 centralized windrow composting facilities that include:

Table 7.4
Metropolitan Toronto
Summary of Existing Residential Waste Diversion System Performance
1992

Regional Characteristics	
Regional Population	2,289,798
Total Number of Households	875,021
— single-family detached	289,330
— high-rise	315,283
— semi and low-rise	270,408
Households served by curbside	704,000
Number of backyard composters distributed	105,000
Residential Material Diverted in 1992	
Blue Box	99,671 tonnes
Depots (Blue Box materials)	2,611 tonnes
Other materials	10,088 tonnes
Leaf and yard waste collection and composting	71,062 tonnes
Diversion through backyard composters	17,745 tonnes
Total residential waste diverted	201,177 tonnes
Residential waste diversion summary	
Residential waste generated	1,069,790 tonnes
Residential waste diverted	201,177 tonnes
Residential waste disposed	868,613 tonnes
Residential waste diversion rate	18.8%

Sources: Social Environment Technical Appendix, May, 1994.
Regional and Municipal Staff, 1993.
Reports to Council.

Figure 7.1
Metropolitan Toronto
Estimated Waste Flow
Residential System 1 — Existing



- the Avondale (Keele Valley landfill) site;
- three sites in North York;
- one site in Etobicoke; and
- one site in Scarborough.

The Keele Valley facility has accepted waste from the cities of York and Toronto and the Borough of East York, however, due to odour complaints and other problems, North York and Etobicoke may also send leaf and yard waste from their facilities to the Keele Valley for processing in the future.

Other Residential Waste Diversion

Reuse Activities: Salvation Army and Goodwill Industries provide drop-off containers and trailers for reusable clothing, appliances and furniture. Goodwill operates 10 "Attended Donation Centers" and 20 stores for donating clothing and small items in the GTA. Goodwill is interested in pursuing joint projects with municipalities . As an example, Laidlaw Industries provides textile collection through the Blue Box program in Mississauga and provides the collected material to Goodwill Industries. Goodwill sorts the materials and prepares them for resale at retail stores. In 1992, Goodwill collected about 10,000 tonnes of material in the GTA.

St. Vincent de Paul Society also organizes textile collections through individual parishes of the Catholic Church.

The ReUze Center in Scarborough is a private reuse operation that accepts hardware and building materials such as cabinets, doors, electrical supplies, floor coverings, hardware, heating supplies, plumbing fixtures, windows, drywall, lumber and plywood for resale. A grant of $237,000 was received from the MOEE (through the Industrial Waste Diversion Program) for its establishment. It receives approximately 100 tonnes per month.

Second Harvest is an organization that acts as a broker between sources of surplus, perishable food and social service organizations that can use the food. It receives food from catered events, retailers, manufacturers, grocery stores, restaurants, hotels, hospitals, convention facilities, corporate cafeterias, bakeries, etc. It is currently working with Transport Canada and health authorities to collect surplus milk and other packaged food from Air Canada and Cara Foods. In 1992, Second Harvest diverted 450 tonnes of food to social service organizations (Heaton, 1993).

East York has organized goods exchange days to facilitate reuse activities. Quantification of diversion from goods exchange days is not carried out, but tonnages are expected to be relatively low.

Household Hazardous Waste (HHW) Program: Metro Toronto operates ten permanent HHW depots including eight in Metro, one at the Keele Valley landfill and one at the Brock West landfill. These depots are open two days per week and are available for Metro, Durham and York residents only. Metro also operates two Toxic Taxis which provide collection services six days per week to residents with a minimum of 10L of HHW requiring disposal. The Toxic Taxis collected 513 tonnes in 1990, and 883 tonnes in 1991.

White Goods: East York, Etobicoke, and York offer residents curbside collection of white goods. Etobicoke also has a drop-off depot.

Residential Promotion and Education

Metro Toronto has published a waste reduction guide called *Your Guide To Waste Reduction and Recycling in Metropolitan Toronto, Second Edition* (Metropolitan Toronto Works Department 1991). The guide is intended to help residents in reducing, reusing and recycling waste. Contents include: the locations of recycling depots, information on what to do with specific materials (household hazardous waste, furniture, grass clippings, etc.), and a listing of local charitable organizations and reuse centres.

Promotional videos, office paper recycling guides, educational kits, waste reduction and recycling plans, and markets directories, all developed by Metro Toronto, are available to encourage the IC&I sector to adopt responsible waste management practices.

Metro Toronto operates a general information hotline on waste reduction and provided funding support to Ontario Recycling Information Service which provides information over the phone and maintains a resource library. (Metro funding for this service was withdrawn in 1993).

Material Recycling Facilities (MRFs)

Metro Toronto is served by three MRFs including:

- the CRInc MRF on Commissioners Street which began operation in May, 1992 to process only container materials (glass, plastics, cans, etc.). It is located on the site of the former Commissioners St. incinerator, is owned by Metro and operated under contract by CRInc. The building is 15,000 square feet in size.

  In the last eight months of 1992, CRInc processed 22,000 tonnes of recyclables. Of this, approximately 10% was residue and non-recyclable materials such as unmarketable glass, string, ceramics, etc. The facility operated 16 hours, 5 days per week with a daily staff of 30.

  The annual design throughput capacity is 25,000 tonnes/year.

- QUNO, which has operated through contract with Metro to process residential recyclables since November, 1988. QUNO operates a 10,000 square foot facility which is also located on Commissioners Street.

  In 1992, QUNO processed both fibres and container materials, operating 24 hours, 5 days per week. The facility operated at capacity, with 21 processing staff and 1 administrative staff, for a total of 22 staff members. In 1992, it processed 37,740 tonnes of recyclables of which 6 to 7% was fibre residue, and 20% was commingled glass residue. In April 1993, QUNO ceased processing Metro container materials, and continued with fibre processing. After this date, containers previously processed at QUNO were processed at the Commissioners Street CRInc facility.

- Dufferin MRF, located in Downsview. This facility is owned by Metropolitan Toronto and operated by QUNO. In 1992, there were 6 processing staff and 1 administrative staff, for a total of 7 staff members.

  In 1992, the MRF processed approximately 18,870 tonnes of recyclables, of which 4 to 5% was residue. The MRF operated on a single 8 hour shift, 5 days per week, and was operating at capacity in 1992.

Assuming that the existing MRFs can provide capacity to process at least 100,000 tonnes/year of dry materials for the foreseeable future, one new MRF, with capacity to process 20,600 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Existing System.

Diversion Achieved

Residential diversion by the Existing System was estimated at 18.8% in 1992.

7.2 System 2 - Existing/Committed

In general, the Existing/Committed system includes:

- all facilities committed in the Region's most recent five year capital funding budgets (1994 to 1998);
- provincial 3Rs regulations (described in Chapter 5.0); and
- any other policy commitments at the local, regional, provincial or federal level, which had been announced by the end of 1992.

The following measures that are outlined in Metro Toronto's 1994 to 1998 Capital and Operating Budget:

- $500,000 for construction of leaf and yard waste bunkers at Metro transfer stations;
- $2,423,000 for improvements to Metro MRFs;
- $1,900,000 for leaf and yard waste composting improvements;
- $1,386,000 for completion of miscellaneous improvements to the recycling system;
- $98,000 for wood shredding.

As of October 1994, fine paper, pizza boxes "gable top" polycoat cartons and boxboard will be added to programs in Metro. This is estimated to divert an additional 3,500 tonnes per year through the Blue Box Program.

A Request for Proposal is being considered, which may allow Metro to utilize capacity at an existing privately or publicly-owned MRF, or allow private industry to design, construct and operate a Metro-owned MRF. The second MRF is required to allow Blue Box materials to be collected in a commingled state from all six municipalities (Kelly, 1994).

Metro also planned to distribute 15,000 to 20,000 additional backyard composters in 1993, providing coverage to 27.5% of single-family households. An additional 10,150 backyard composters will be required to provide the same level of service in the year 2000.

Assuming that the existing MRFs can provide capacity to process at least 100,000 tonnes/year of dry materials for the foreseeable future, one new MRF, with capacity to process 36,600 tonnes of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Existing/Committed System.

Impacts of the 3Rs Regulations

Single Family Households
Metro Toronto consists of six municipalities, all of which have populations significantly greater than 50,000.

All municipalities in Metro would be included in the 3Rs regulations, and would therefore be required to:

- provide recycling services parallel to garbage collection service (curbside or depot);
- collect a list of "basic Blue Box" materials as well as two others;
- provide backyard composting programs; and
- provide leaf and yard waste collection and composting.

Since the required levels of service are well established in most municipalities, the diversion impact of additional services that would result from implementing the 3Rs Regulations in Metro is expected to be minor.

Impacts of 3Rs Regulations on Recycling by Households in Multi-Family Buildings
The 3Rs Regulations require that owners of buildings containing six or more units in communities of greater than 5,000 provide source separation programs for collection by the municipalities. Opportunities are currently available in Metro Toronto for recycling by most (at least 65%) multi-family households (Pollock, 1993). Implementation of the 3Rs Regulations is likely to increase recycling opportunities for multi-family households. The resulting diversion has been estimated assuming that 100% of multi-family households are provided with recycling opportunities (although the exact number of households in buildings containing 6 or more units is not known).

Impacts of Other Policy Commitments

The impacts of NAPP are incorporated into the diversion rates through source reduction estimates. The potential impacts of CIPSI have not been considered in the estimates.

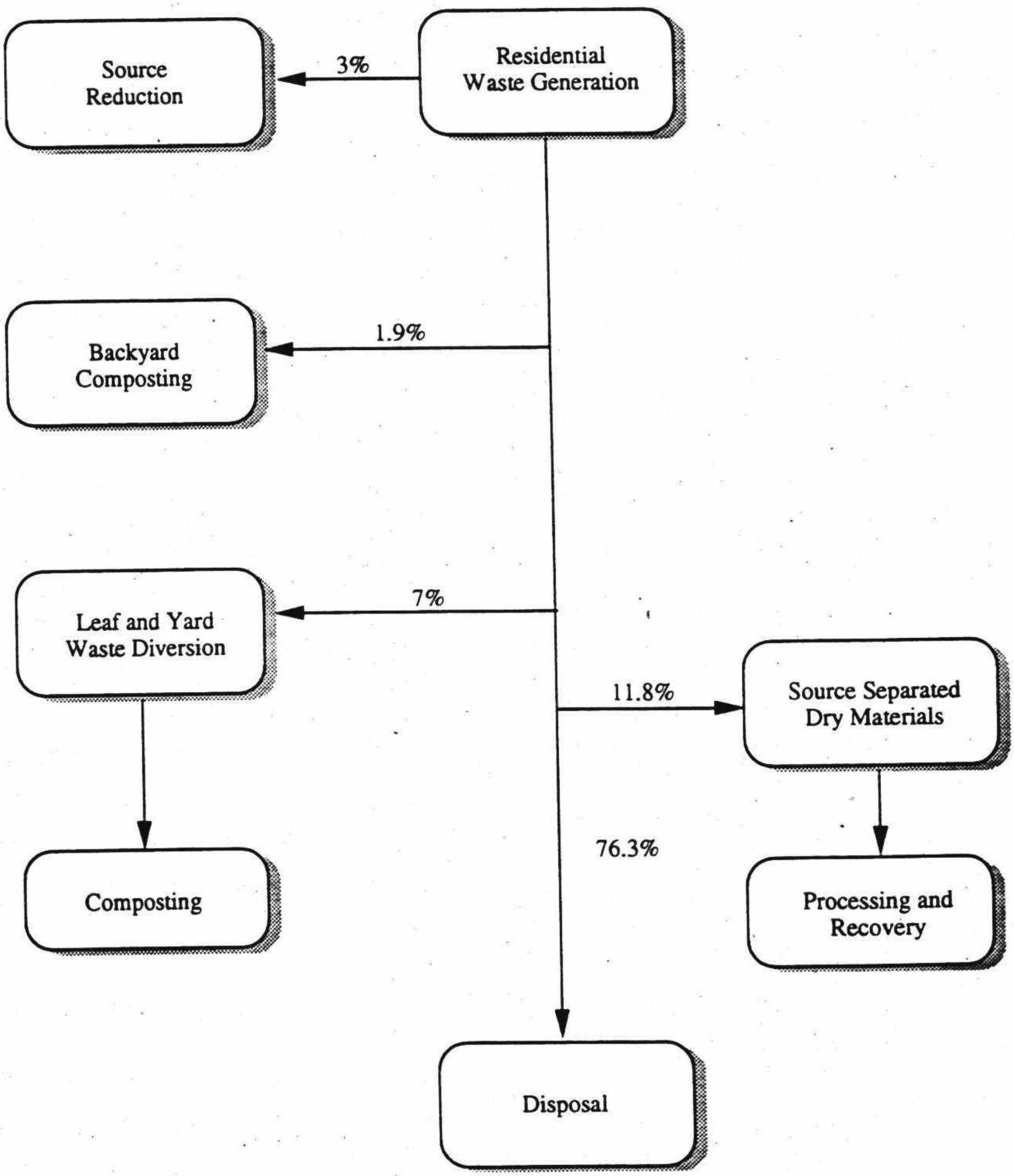
Diversion Achieved

Waste diversion potential in Metro Toronto is limited by the fact that a major segment of its households are located in multi-family buildings where waste diversion is more difficult, and achievements are typically lower than for single-family households. Diversion by the Existing/Committed system will not be significantly greater than that of the Existing System, and is estimated at 21% to 24% by the year 2000. Waste flow for this system is presented schematically in Figure 7.2.

7.3 System 3 - Direct Cost

A Direct Cost system would charge a rate of $1 per bag or tag for garbage disposal by single-family households. Recyclables (Blue Box) and leaf and yard waste collection programs would be provided at no direct charge to the householder. This system provides an economic incentive for householders to divert more dry materials through the existing Blue Box system, more leaf and yard waste through backyard composting and separate curbside collection, and also to divert household food wastes through backyard composters.

Figure 7.2
Metropolitan Toronto
Estimated Waste Flow
Residential System 2 — Existing/Committed



Backyard composters would be distributed to 80% of single-family households (392,637 composters by the year 2000). Because backyard composters have been distributed to 125,000 households by 1993, this would require distribution of an additional 257,483 backyard composters by the year 2000. It is assumed that because of the strong economic incentive to do so, up to 90% of these households would use backyard composters and divert an average of 169 kg/composter/year. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

The Direct Cost System would impact on the behaviour of 490,796 single-family households by the year 2000 (whose garbage is either disposed at the curb, or hauled to transfer stations). Multi-family households would not be impacted, as their garbage is managed by building owners and the private sector.

The Direct Cost System requires collection of only the materials that are collected in the Region's Existing/Committed system and does not rely on the addition of more materials or services to increase diversion. Assuming that the existing MRFs can provide capacity to process at least 100,000 tonnes/year of dry materials for the foreseeable future, one new MRF, with capacity to process 95,000 tonnes of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Direct Cost System.

On the basis of the assumptions presented in Section 5.8, diversion by the Direct Cost System is estimated at 29% to 32% by the year 2000. Waste flow for the Direct Cost System is presented schematically in Figure 7.3.

7.4 System 4 - Expanded Blue Box

The Existing/Committed System in Metro Toronto collects:

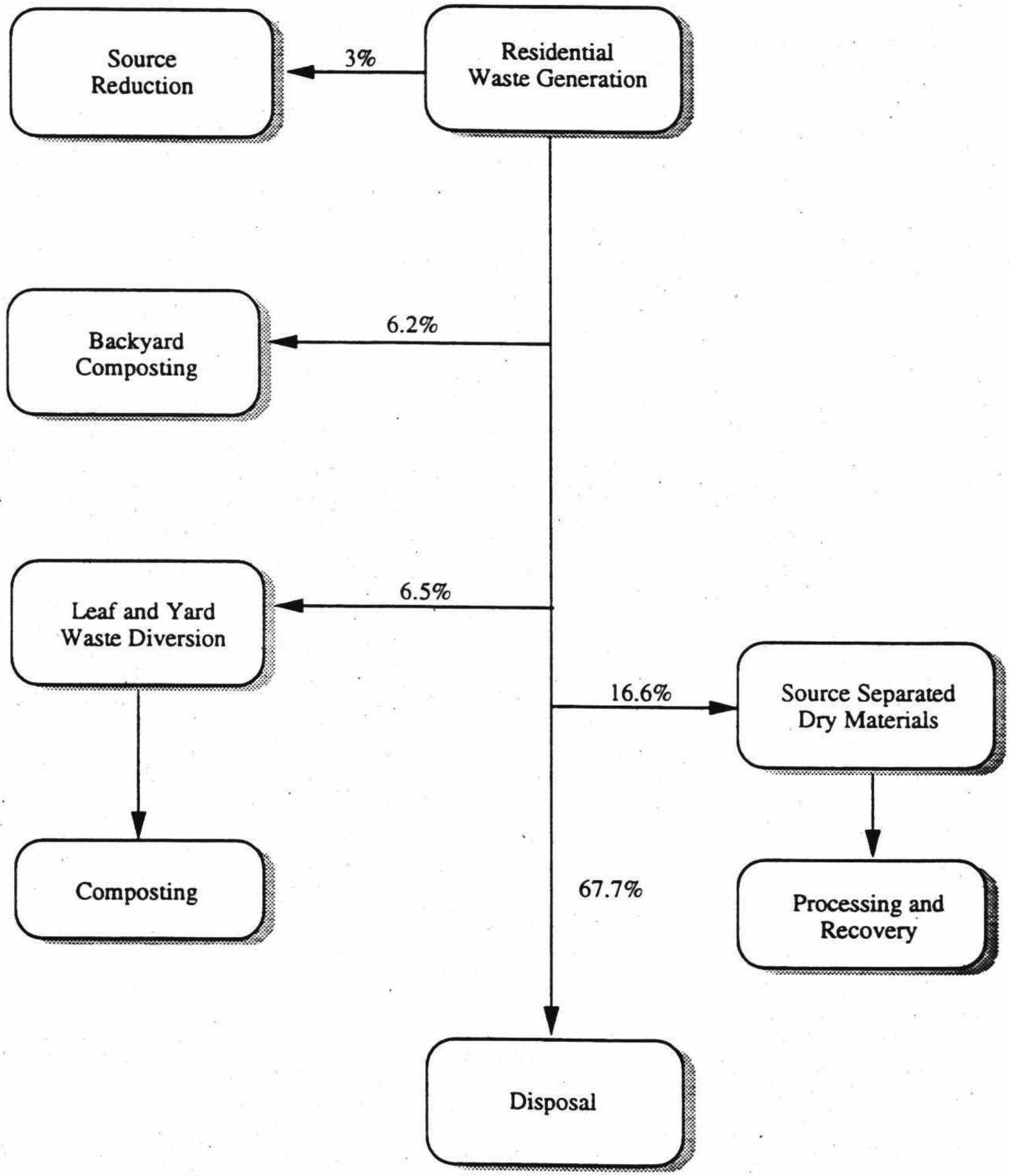
- ONP;
- OMG;
- OCC;
- Telephone Directories;
- Aluminum;
- Steel;
- Glass;
- PET;
- HDPE.

The Expanded Blue Box System would therefore require additional collection of the following materials:

- boxboard;
- polycoat (e.g. milk cartons);
- other rigid plastic bottles & tubes (PVC, PP, LDPE);
- film plastic (LDPE);
- foam plastic and rigid trays (PS);
- textiles;
- mixed paper.

In addition, backyard composters would be distributed to a total of 392,637 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

Figure 7.3
Metropolitan Toronto
Estimated Waste Flow
Residential System 3 — Direct Cost



Multi-family households would be assumed to divert dry materials at 50% of the rate of single family households. Assuming that the existing MRFs can provide capacity to process at least 100,000 tonnes/year of dry materials for the foreseeable future, one new MRF, with capacity to process 147,000 tonnes of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Expanded Blue Box System.

Diversion by the Expanded Blue Box System is estimated at 33% to 36% by the year 2000. Waste flow for the Expanded Blue Box System is presented schematically in Figure 7.4.

7.5 System 5 - Wet/Dry

A three stream Wet/Dry System would serve all single-family households in the Region (490,796 households) by the year 2000. Some multi-family units would also be served with wet/dry collection, depending on space availability in the buildings and on building owners' willingness to participate in the program. Multi-family units would be assumed to divert both wet and dry materials at 50% of the rate of single-family households. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

Backyard composters would be distributed to a total of 257,483 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year. A central in-vessel composting facility with a design capacity of 242,000 tonnes/year would be required to process collected household wet waste.

Assuming that the existing MRFs in Metro will be able to process at least 100,000 tonnes/year of dry materials for the foreseeable future, one new MRF, with capacity to process 147,000 tonnes of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Wet/Dry System.

In Metro Toronto, diversion through wet/dry collection will be proportionately lower than in some other Regions due to the high number of multi-family households (48.6% of all households) that will only divert wet and dry materials at 50% the rate of single-family households. There will also be several multi-family buildings that will not divert wet materials at all.

Diversion by the Wet/Dry system is estimated at 44% to 47% by the year 2000. Waste flow in the Wet/Dry system is shown schematically in Figure 7.5.

7.6 System 6 - Mixed Waste Processing

The Mixed Waste Processing and composting system builds on the Existing/Committed system, and processes the "third bag" of garbage (which remains after Blue Box recycling, leaf and yard waste collection and backyard composting) in a mixed waste processing and composting plant. Some additional dry recyclables are removed and processed at the front end of the mixed waste processing and composting plant, and the remaining mixed waste stream is composted. Finished compost that meets MOEE guidelines would be marketed, but in a worst case scenario (where compost quality does not meet MOEE guidelines), it may require disposal in landfill. In either scenario, considerable mass reduction occurs in the composting process which results in a reduction of the tonnage leaving the mixed waste composting plant.

Backyard composters would be distributed to a total of 257,483 single-family households by the year 2000. It is assumed that 70% of these composters would be used effectively to divert 169 kg/composter/year. In addition, it is assumed that up to 50% of multi-family households

Figure 7.4
Metropolitan Toronto
Estimated Waste Flow
Residential System 4 — Expanded Blue Box

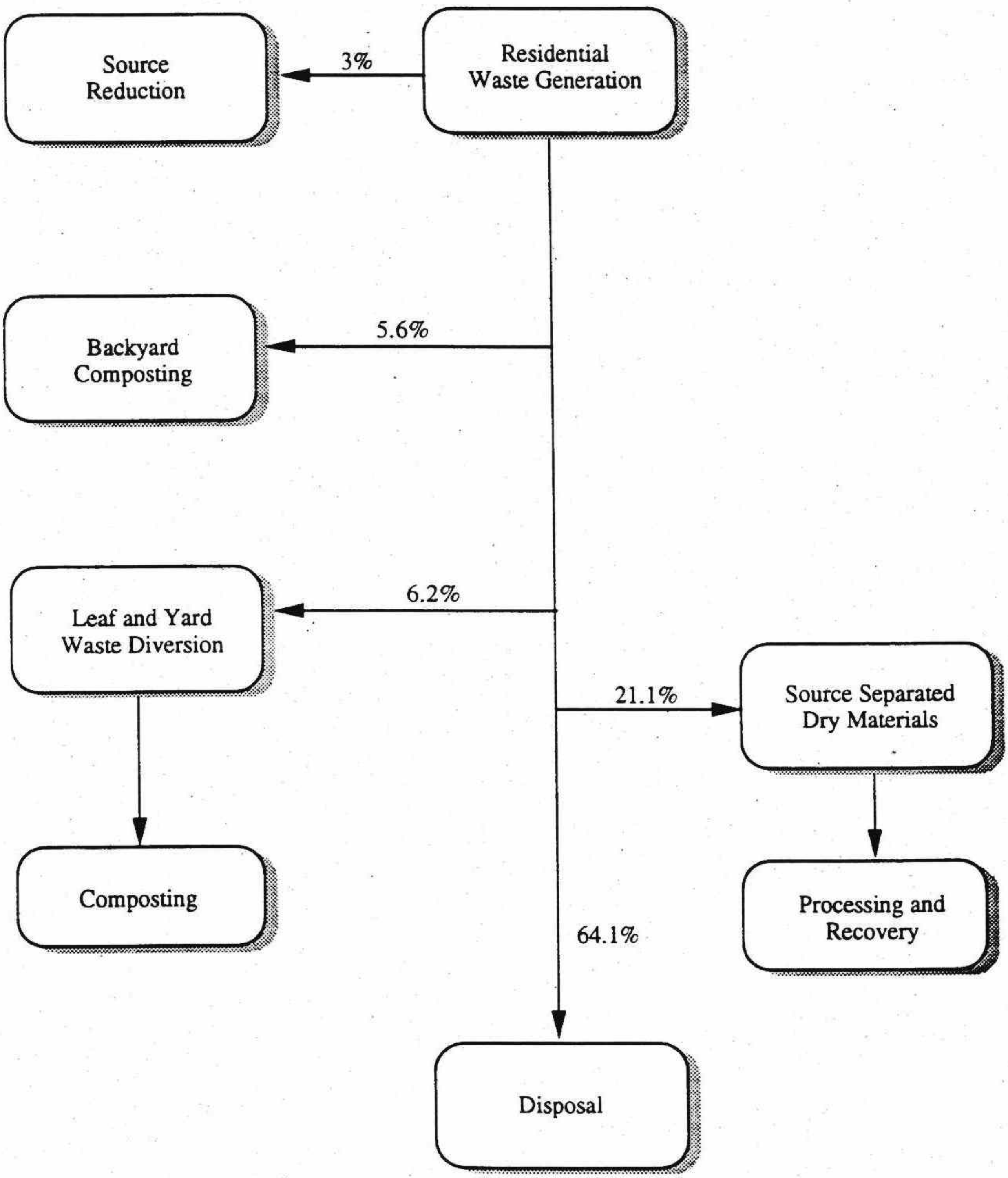
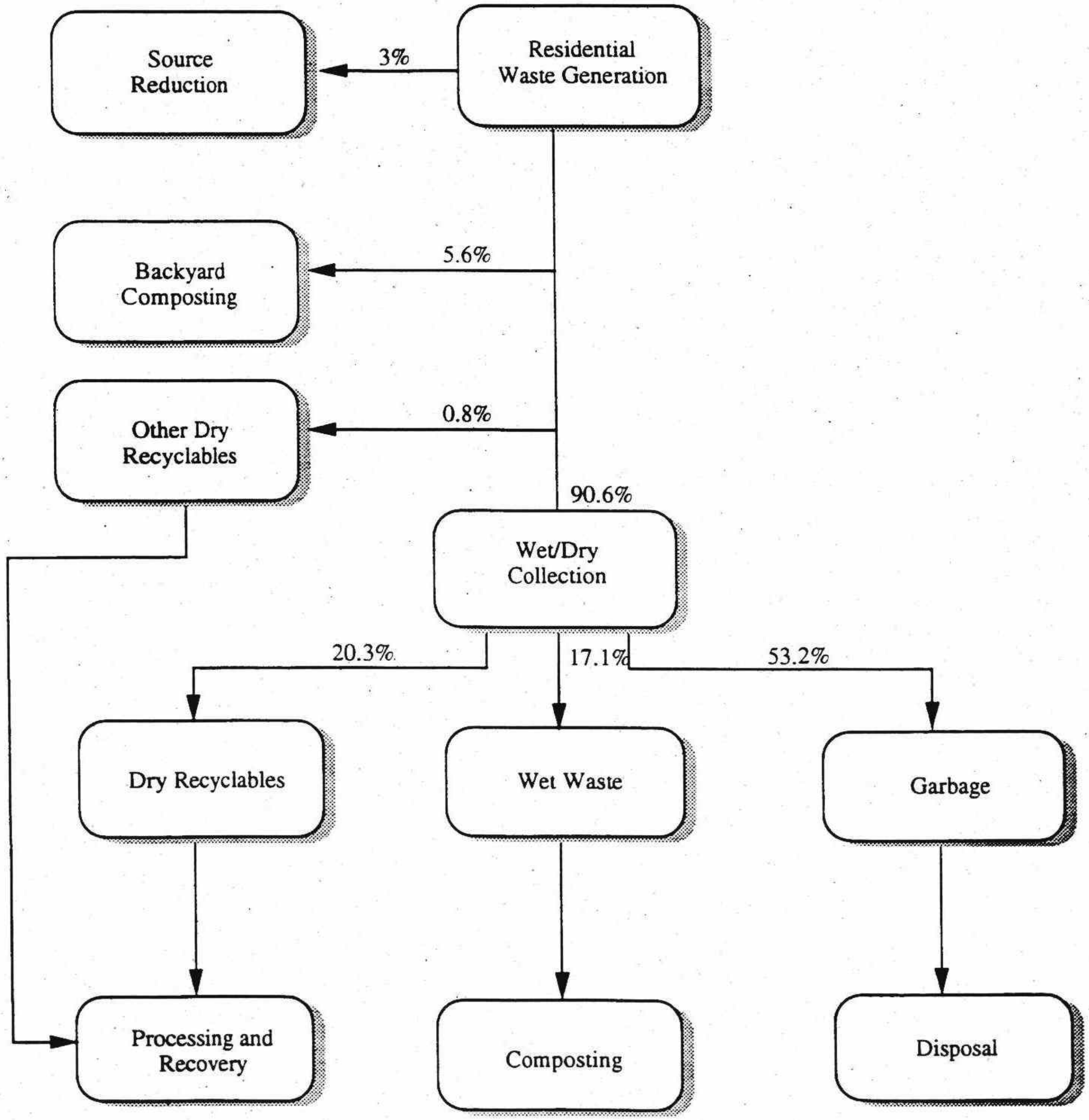


Figure 7.5
Metropolitan Toronto
Estimated Waste Flow
Residential System 5 — Wet/Dry



may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes. Multi-family households would be assumed to divert dry materials at 50% the rate of single family households.

Assuming that the existing MRFs in Metro will be able to process at least 100,000 tonnes/year of dry materials for the foreseeable future, one new MRF, with capacity to process 36,600 tonnes of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Mixed Waste Processing System. Two mixed waste processing and composting plants with design capacity of 467,000 tonnes/year (each) would be required to process the mixed waste stream.

Diversion, by the year 2000, by the Mixed Waste Processing and composting system is estimated at:

> 52% to 55% if compost quality does not meet MOEE standards, and
> 72% to 75% if compost quality meets MOEE standards.

Waste flow in the Mixed Waste Processing system is shown schematically in Figure 7.6.

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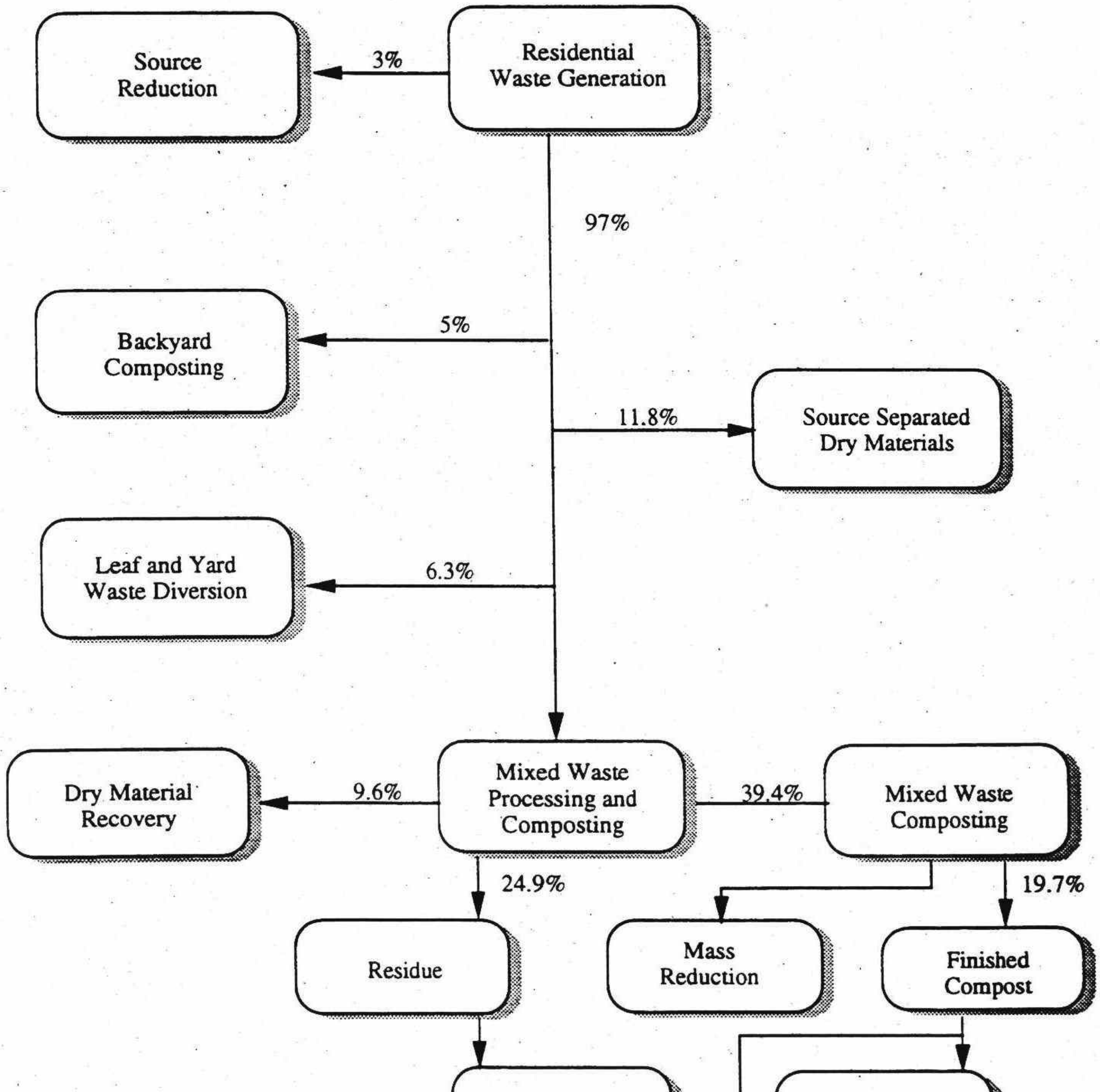
Figure 7.6
Metropolitan Toronto
Estimated Waste Flow
Residential System 6 — Mixed Waste Processing



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8.0 REGION OF YORK RESIDENTIAL SYSTEM DIVERSION ESTIMATES

8.0 REGION OF YORK RESIDENTIAL SYSTEM DIVERSION ESTIMATES

This chapter describes the six residential waste diversion systems and estimates of the diversion achievable by these systems as applied to the Region of York.

Table 8.1 presents the components of the six systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the estudy period (to accomodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

The diversion achieved by each system is summarized in Table 8.2.

Table 8.2
Estimated Residential Waste Diversion in Region of York in Year 2000

System	Estimated Diversion by Year 2000	
	No Source Reduction	Source Reduction
1–Existing	28%	31%
2–Existing/Committed	29%	32%
3–Direct Cost	43%	46%
4–Expanded Blue Box	44%	47%
5–Wet/Dry	57%	60%
6A-Mixed Waste Processing (Low Quality Compost)	59%	62%
6B-Mixed Waste Processing (High Quality Compost)	77%	80%

Two diversion values are presented for each system. The lower value is achievable by the year 2000 if no source reduction occurs. The higher value is achievable by the year 2000 if a 3 % level of source reduction is achieved. In all cases it is assumed that the system is fully operational and mature by the year 2000.

Table 8.3 presents the estimated tonnages of material diverted by each system (using 1992 data).

The housing mix impacts on the extent to which different diversion components are effective, as described in Chapter 5.0. The Region is expected to have predominantly single-family housing in the future. By the year 2000, housing in the Region is expected to consist of the following housing mix (HSA 1994):

single-family detached	164,403	(75% of total);
semi & low rise	22,094	(10% of total);
high rise dwellings	33,905	(15% of total);
Total Households (year 2000):	220,402.	

Table 8.1
York Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection (King City)	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • *Direct cost system for garbage collection* • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection	**Garbage Collection** • *Curbside collection of residential waste from single family dwellings in three streams by specially designed trucks by municipal forces or contractors to municipalities* • *Collection of residential garbage from multi-family units in three streams by municipal forces or private contractors, where feasible* • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings • Collection of residential garbage from multi-family units by private contractors • Self haul of waste to landfills and transfer stations by residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads • Limit on number of bags/containers set-out for garbage collection
Residential Recycling and Collection • Curbside collection of dry recyclables by municipal forces or private contractors • Materials collected by different municipalities include: ONP, glass, steel, aluminum, PET, OCC, telephone directories, HDPE, rigid and other plastics • Assume collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Curbside collection of dry recyclables by municipal forces or private contractors* • *Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations* • *Curbside collection of additional dry materials* • *Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations)* • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • Curbside collection of dry recyclables by municipal forces or private contractors • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Curbside collection of additional dry materials • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • *Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units* • *Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units*	**Residential Recycling and Collection** • *Provide carts to all single family households and some "other" households* • *Separation of waste into three streams (wet, dry, and garbage) by the householder* • *Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • *Large bins provided in the garbage management area of multi-family buildings if space permits. Residents will be encouraged to separate their waste into three separate bags*	**Residential Recycling and Collection** • Expansion of curbside collection of Blue Box materials from single family dwellings in some municipalities to include all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Curbside collection of additional dry materials • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • Collection of bins of recyclables from multi-family units

Table 8.1
York Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Recycling Depots and Transfer Stations • Assume drop-off depots for multi-family residents not serviced by recycling • Assume drop-off depot for rural households • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials	**Residential Recycling Depots and Transfer Stations** • *Drop-off depots for multi-family residents not serviced by recycling* • *Some additional recycling service to multi-family units* • *Some additional recycling at new depots* • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials	**Residential Recycling Depots and Transfer Stations** • Drop-off depots for multi-family residents not serviced by recycling • Some additional recycling service to multi-family units • Some additional recycling at new depots • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials	**Residential Recycling Depots and Transfer Stations** • *Drop-off depots for multi-family residents not serviced by recycling (collecting all Expanded Blue Box materials)* • *Drop-off depot for rural households (collecting all Expanded Blue Box materials)* • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials	**Residential Recycling Depots and Transfer Stations** • Drop-off depots for multi-family residents not serviced by recycling. • Drop-off depot for rural households. • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials	**Residential Recycling Depots and Transfer Stations** • Drop-off depots for multi-family residents not serviced by recycling • Some additional recycling service to multi-family units • Some additional recycling at new depots • Depot at Markham for boxboard, mixed paper, scrap metal and tires, in addition to Blue Box materials
Residential Leaf and Yard Waste Collection • Seasonal curbside collection of leaf and yard waste • Drop-off depot for leaf and yard waste at regions composting site - no charge to residents	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Drop-off depot for leaf and yard waste at regions composting site - no charge to residents	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Drop-off depot for leaf and yard waste at regions composting site - no charge to residents	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Drop-off depot for leaf and yard waste at regions composting site - no charge to residents	**Residential Leaf and Yard Waste Collection** • *Collection of leaf and yard waste as part of three stream pick-up* • *Separate brush collection*	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Drop-off depot for leaf and yard waste at regions composting site - no charge to residents
Residential Household Composting • Backyard composter distribution programs (29,050 composters by end of 1992) • Limited community composting • Limited vermicomposting	**Residential Household Composting** • Backyard composter distribution programs (29,050 composters by end of 1992) • Distribution of additional backyard composters by individual municipalities • Additional community composting • Additional vermicomposting	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Promotion of large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Promotion of large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Promotion of large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*
Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). • Special curbside collections of Christmas trees • Curbside collection of white goods in all municipalities - frequency varies • Drop-off depots for white goods (King Township) • Mobile HHW depots • HHW collection days (some municipalities)	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods in all municipalities - frequency varies • Drop-off depots for white goods (King Township) • Mobile HHW depots • HHW collection days (some municipalities)	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods in all municipalities - frequency varies • Drop-off depots for white goods (King Township) • Mobile HHW depots • HHW collection days (some municipalities)	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods in all municipalities - frequency varies • Drop-off depots for white goods (King Township) • Mobile HHW depots • HHW collection days (some municipalities)	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods in all municipalities - frequency varies • Drop-off depots for white goods (King Township) • Mobile HHW depots • HHW collection days (some municipalities)	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Curbside collection of white goods in all municipalities - frequency varies • Drop-off depots for white goods (King Township) • Mobile HHW depots • HHW collection days (some municipalities)

Table 8.1
York Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Composting Facilities • Centralized windrow composting of leaf and yard waste (operated by Miller Waste Systems)	**Composting Facilities** • Centralized windrow composting of leaf and yard waste	**Composting Facilities** • Centralized windrow composting of leaf and yard waste	**Composting Facilities** • Centralized windrow composting of leaf and yard waste	**Composting Facilities** • Existing centralized windrow leaf and yard waste composting facilities may be closed • *New central composting facility (in vessel) for composting of source separated household organics (wet stream) and leaf and yard waste*	**Composting Facilities** • Centralized windrow composting of leaf and yard waste • *New mixed waste processing and composting facility*
Reuse Centres and Activities • Goods exchange days in Richmond Hill	**Reuse Centres and Activities** • Goods exchange days in Richmond Hill	**Reuse Centres and Activities** • Goods exchange days in Richmond Hill	**Reuse Centres and Activities** • Goods exchange days in Richmond Hill	**Reuse Centres and Activities** • Goods exchange days in Richmond Hill	**Reuse Centres and Activities** • Goods exchange days in Richmond Hill
MRFs • Markham MRF owned by Markham but operated by Miller Waste Systems. Currently operating on a temporary basis (will be replaced by new regional facility that is being built). Processes ONP, container materials and other recyclables - 15,900 tonnes in 1992 • Richmond Hill MRF operated by Miller - 8,400 tonnes processed in 1992. It too will be replaced by planned regional facility • New MRF will be required to meet 20 year needs • Existing MRFs will close when new MRF constructed	**MRFs** • New MRF will be required to meet 20 year needs • Existing/committed MRF in capital budget ($2.2 million) in operation in 1993 • Other MRFs will close when new MRF constructed	**MRFs** • *One new Regional MRF for processing of dry recyclables* • MRF in existing/committed system would close when new MRF operational	**MRFs** • *One new Regional MRF for processing of dry recyclables* • MRF in existing/committed system would close when new MRF operational	**MRFs** • *One new Regional MRF for processing of dry recyclables* • MRF in existing/committed system would close when new MRF operational	**MRFs** • One new Regional MRF for processing of dry recyclables • MRF in existing/committed system would close when new MRF operational
Residential Promotion and Education • Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities • Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers • Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools	**Residential Promotion and Education** • Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities • Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers • Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools	**Residential Promotion and Education** • Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities • Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers • Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools • *Promotion/education program on direct cost system* • *Promotion/education program on source reduction, pre-cycling, reuse and recycling*	**Residential Promotion and Education** • Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities • Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers • Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools • *Promotion/education program on Expanded Blue Box program* • *Promotion/education program on source reduction, pre-cycling, reuse and recycling*	**Residential Promotion and Education** • Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities • Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers • Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools • *Promotion/education program for wet/dry system* • *Promotion/education program for source reduction, pre-cycling, reuse, recycling*	**Residential Promotion and Education** • Region only advertises HHW and leaf and yard waste programs. Other programs are left to the municipalities • Municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers • Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools • *Promotion/education program on source reduction, pre-cycling, reuse and recycling*

Table 8.3
Region of York
Residential System Diversion Estimates
1992

Component	Existing System Diversion (tonnes)	Existing/ Committed Diversion (tonnes)	Direct Cost System Diversion (tonnes)	Expanded Blue Box Diversion (tonnes)	Wet/Dry System Diversion (tonnes)	MSW (compost landfilled) (tonnes)	MSW (compost marketed) (tonnes)
Total Residential Waste (tonnes)	54,100	56,981	84,910	86,454	112,384	116,764	151,954
Paper							
Newspaper	16,641	17,788	25,052	25,535	25,535	26,817	31,313
Corrugated cardboard (OCC)	677	724	2,888	3,031	3,031	3,824	4,749
Telephone Directories	75	80	251	263	263	284	345
Mixed paper	69	73	71	3,956	3,956	14,722	26,334
Subtotal (Paper)	17,462	18,665	28,262	32,784	32,784	45,647	62,741
Glass	5,770	6,167	6,467	6,489	6,489	6,894	6,894
Tinplate Steel (ferrous)	2,796	2,989	4,367	4,426	4,426	5,963	5,963
Aluminum (non-ferrous)	91	97	704	743	743	1,011	1,011
Plastic							
PET	282	301	316	317	317	403	403
HDPE	404	432	373	369	369	495	495
Other Plastic				1,438	1,438	0	0
Subtotal (Plastic)	686	733	689	2,125	2,125	898	898
Organics							
Food wastes	3,338	3,338	12,334	11,019	33,230	24,323	38,940
Yard waste	17,871	18,905	26,001	22,282	26,001	24,915	28,167
Subtotal (Organics)	21,209	22,243	38,335	33,301	59,231	49,238	67,107
Wood Waste		0	0	0	0	79	157
Construction/Demolition Waste		0	0	0	0	149	297
Disposable Diapers		0	0	0	0	0	0
Textiles/Leather/Rubber	61	61	61	561	561	860	860
Other	6,025	6,025	6,025	6,025	6,025	6,025	6,025
Subtotal (Wood - Other)	6,087	6,087	6,087	6,586	6,586	7,113	7,341
TOTAL	**54,100**	**56,981**	**84,910**	**86,454**	**112,384**	**116,764**	**151,954**
Diversion Estimate =	**28%**	**29%**	**43%**	**44%**	**57%**	**59%**	**77%**

A full description of the methodology used to estimate residential waste diversion is described in Chapter 5.0. Features and results specific to the Region of York are discussed in this chapter.

The Region of York is the only Regional government within the GTA which does not co-ordinate the recycling programs of its member municipalities. Each municipality is responsible for the implementation and operation of its own recycling programs.

8.1 System 1 - Existing

Information on residential waste diversion activities was obtained from the following sources:

- survey of regional and municipal staff, February-March 1993;
- on-going discussions with regional and municipal staff, February-July, 1993;
- miscellaneous reports to council, internal memoranda, etc. which are referenced at the end of this chapter.

In 1992, an estimated 196,250 tonnes of residential waste were generated in the Region of York. Of this, 54,100 tonnes were diverted and 142,150 tonnes were disposed.

Residential recycling services in place as at December 31, 1992 consisted of the following activities:

- All municipalities offered curbside collection of Blue Box Recyclables;
- Markham collected materials from recycling depots - no figures on exact quantities are available. The depots accepted all Blue Box materials, plus boxboard, mixed paper, scrap metal and tires. Whitchurch-Stouffville was the only other municipality reporting any depot collection;
- 29,050 backyard composters were distributed;
- extensive promotion and education programs;
- seasonal curbside collection of leaf and yard waste and drop-off at the regional composting site;
- one Regional leaf and yard waste composting site;
- periodic HHW collection days;
- two mobile HHW depots;
- periodic curbside collection of white goods;
- drop-off depot for white goods collection at King Township landfill (for King residents);
- two MRFs, one owned by Markham and the other owned by Richmond Hill. Both are operated by Miller Waste Systems Ltd.

Residential waste diversion was made up of the following activities:

Dry recyclables	25,433 tonnes
Other materials	7,458 tonnes
Leaf and yard waste	16,300 tonnes
Household wet waste through backyard composters	4,909 tonnes
Total diverted 1992	54,100 tonnes

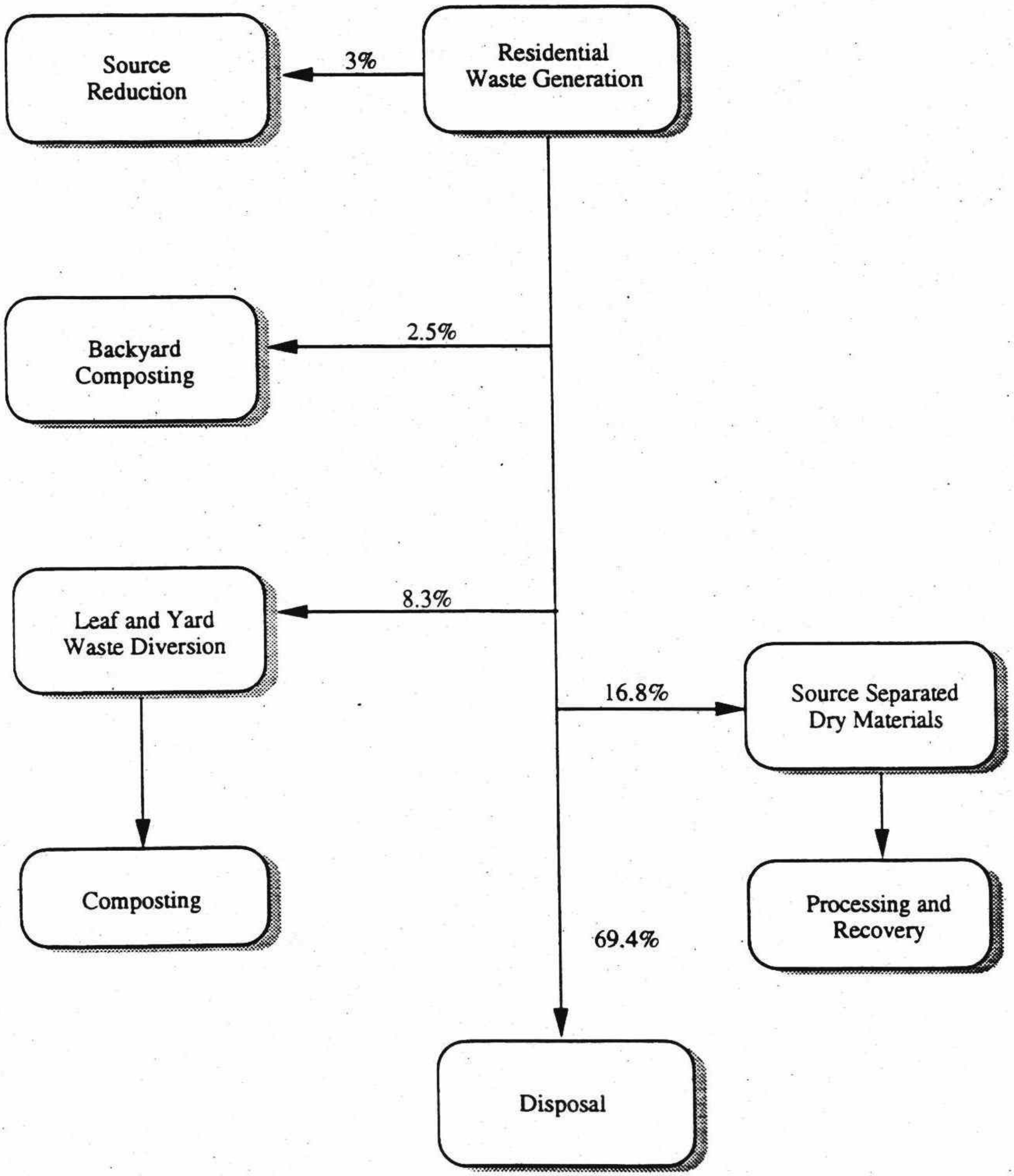
This information is summarized in Table 8.4, and is presented schematically in Figure 8.1. A more detailed description of diversion activities is presented in the text below. References for the information presented are contained in Section 8.7.

Table 8.4
Region of York
Summary of Existing Residential Waste Diversion System Performance
1992

Regional Characteristics	
Regional Population	524,296
Total Number of Households	161,654
— single-family detached	128,466
— high-rise	13,283
— semi and low-rise	19,905
Households served by curbside	159,507
Number of backyard composters distributed	29,050
Residential Material Diverted in 1992	
Blue Box	25,433 tonnes
Other Materials	7,458 tonnes
Leaf and yard waste collection and composting	16,300 tonnes
Diversion through backyard composters	4,909 tonnes
Total residential waste diverted	54,100 tonnes
Residential waste diversion summary	
Residential waste generated	196,250 tonnes
Residential waste diverted	54,100 tonnes
Residential waste disposed	142,150 tonnes
Residential waste diversion rate	27.6%

Sources: Social Environment Technical Appendix, May, 1994.
Regional and Municipal Staff, 1993.
Reports to Council.

Figure 8.1
Region of York
Estimated Waste Flow
Residential System 1 — Existing



Residential Recycling and Collection

In 1992, the following tonnages of materials were collected and processed in two Regional MRFs:

- 16,641 tonnes of ONP and OMG (commingled);
- 677 tonnes of OCC;
- 75 tonnes of Telephone Directories;
- 69 tonnes of mixed paper;
- 91 tonnes of Aluminum;
- 2,796 tonnes of Tinplate Steel
- 5,770 tonnes of Glass;
- 282 tonnes of PET;
- 404 tonnes of HDPE;
- 6,087 tonnes of metal, wood, tires, textiles etc.

Residential Household Composting

Backyard composting is the responsibility of the lower tier municipalities, although the Region helped with some promotion. Most of the municipalities charged a fee equivalent to one third the cost of the unit plus an administration charge for distribution of backyard composters to residents. In addition to regular municipal distribution, composters were sold at three retail outlets. Richmond Hill and Markham hired students to conduct a door-to-door promotion and education, sales and delivery campaign. Each municipality supports its backyard composting program with a variety of promotional material, including flyers, brochures, calendars and educational seminars.

An estimated 29,050 backyard composting units had been distributed in the Region of York by the end of 1992 with an estimated coverage rate of 20% of single-family households.

To maintain the same coverage rate in the year 2000, an additional 10,560 backyard composters would be needed, for a total of 39,600 units.

Residential Leaf and Yard Waste Collection/Composting Facilities

In 1992, collection of "green" waste in the Region of York totaled 16,300 tonnes.

A central yard waste composting facility was opened by the Region in 1990 which accepts grass clippings, shrubs, branches and garden plants from residents and commercial businesses. Operations of the facility are contracted to Miller Waste Systems. The facility, which began receiving material in the fall of 1990, is 12 acres in size. Staffing requirements vary according to the season with 6 to 8 employees in the spring and fall, dropping to 3 people in non-peak months.

The contractor assumes responsibility for marketing of the finished compost, although 75% of any revenue received is returned to the Region. In 1991, finished material was given away to the public. Local municipalities were charged $10/tonne to use the material in 1991. At the end of 1992, a significant amount of finished compost was stockpiled on site.

Other Residential Waste Diversion

Reuse Activities: No residential reuse centres (other than social service organizations discussed in the Metro Toronto section) currently operate in the Region of York. Richmond Hill conducts goods exchange days.

Household Hazardous Waste (HHW) Program: Periodic HHW collection days have been conducted in Aurora, Newmarket, East Gwillimbury, Bradford, Richmond Hill, Newmarket, and Whitchurch-Stouffville. Wastes collected at these events were managed by Laidlaw.

In 1992, Richmond Hill collected approximately 252 batteries and 28 tonnes of HHW with a mobile HHW depot. The Region of York also ran a successful pilot mobile HHW depot in 1992.

White Goods: All area municipalities provide some curbside collection to residents (once week, per month or per year) for white goods. Only King Township reported operating a drop-off service at its landfill.

Approximately 54 tonnes of white goods were collected by Markham in 1992. Quantities collected by other municipalities were not available.

Residential Promotion and Education

In general, only HHW and yard waste programs are promoted at the Regional level. Other programs are left to the municipalities. The municipalities conduct extensive promotion through advertising, brochures, hotline phone service and information flyers. Richmond Hill and Markham conducted extensive door to door sales campaigns for composters with assistance from students. Markham also conducted a number of seminars for the general public and schools.

Public Sector Material Recovery Facilities (MRFs)

Recyclables from all nine area municipalities in York Region were processed at one of two MRFs in 1992 including:

- the Town of Markham MRF, which is owned by Markham and operated by Miller Waste Systems Ltd. It serviced recyclables from Markham, Aurora, King and Vaughan in 1992. The MRF began operation in 1988 as a temporary processing facility, and has been operating on the same basis since that time. It operated 9.5 hours per day, 5 days per week in 1992, with 4 staff. Residue quantities were less than 1%, since most of the recyclables sorting and contaminant control is done during collection.

  In 1992, approximately 15,855 tonnes of recyclables were processed at the Markham MRF.

- the Richmond Hill MRF, which is owned by the town, and operated by Miller Waste Systems Ltd. It served Richmond Hill, Newmarket, East Gwillimbury and Whitchurch Stouffville. The facility operated 9.5 hours per day, 5 days per week in 1992, with a daily staff of 2-3. Residue averaged less than 1% of total throughput tonnage.

  The Richmond Hill MRF processed about 8,377 tonnes (excluding East Gwillimbury) from within the Region in 1992.

Georgina collected about 1,200 tonnes of Blue Box materials in 1992. Material from Georgina and Newmarket is now processed at a local MRF by LaRue's Haulage (including residential and some IC&I recyclables) (Carr, 1994). The MRF opened in August, 1993. Information

was provided too late to be incorporated in diversion estimates. The overall cost/diversion impact is expected to be small.

The Region was in the process of establishing a larger, Regional processing facility located in Markham to service all area municipalities in 1992. This facility is expected to be operational in 1994. It has been assumed that one MRF, with capacity to process 51,000 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Existing System.

Diversion Achieved

Residential diversion by the Existing System was estimated to be 27.6% in 1992.

8.2 System 2 - Existing/Committed

In general, the Existing/Committed system includes:

- all facilities and programs committed in the Region's most recent five year capital funding budgets (1993 to 1997, or 1994 to 1998 if available);
- impacts of the provincial 3Rs regulations (described in Chapter 5.0); and
- any other policy commitments at the local, regional, provincial or federal level, which had been announced by the end of 1992.

Region of York's 1992 Development Charges Study and the 1993 Capital and Operating Budgets and five year forecast for Waste Diversion included the following items (Future Urban Research, 1994):

- $2,224,000 for a Regional MRF. It is intended that the existing municipal facilities will terminate operations when the Regional facility commences operations;
- $561,100 for miscellaneous improvements to the existing recycling system.

No expansion in the range of materials collected in curbside recycling programs is planned at the Regional level. Individual municipalities will also be distributing additional backyard composters to residents, however, exact numbers are not known.

The Town of Markham will start a demonstration wet/dry (3-stream) project in Unionville in May 1994. The project involves approximately 2,500 households, and will demonstrate the potential for using a new truck design.

An additional 9,460 backyard composters will be required to provide the same level of service in the year 2000. It has been assumed that one MRF, with capacity to process 55,000 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Existing/Committed System.

Impacts of the 3Rs Regulations

Single Family Households
The Region of York includes nine municipalities. Three of these have populations of greater than 50,000 (Vaughan, Markham and Richmond Hill), while Newmarket has a population of just under 50,000, and the five remaining municipalities (Aurora, East Gwillimbury, Georgina, Whitchurch-Stouffville and King Township) have populations between 5,000 and 50,000.

All municipalities in Region of York would be included in the 3Rs regulations, and would therefore be required to:

- provide recycling services to parallel garbage collection service (curbside or depot);
- collect a list of "basic Blue Box" materials as well as two others; and
- provide backyard composting programs.

This level of service is currently in place, with the exception of some smaller communities, which may not presently include the 2 supplementary materials required in Blue Box collection. In general, the designated materials (ONP, aluminum, glass, steel and PET food and beverage containers) are already collected, in addition to OCC, telephone directories, and HDPE.

All municipalities of greater than 50,000 (Vaughan, Markham and Richmond Hill) are also required to provide leaf and yard waste collection programs. These municipalities currently meet this requirement with collected leaf and yard waste which is composted at the Regional compost site. Under the regulations, other municipalities between 5,000 and 50,000 that have leaf and yard waste collection programs are required to compost the material collected. The existing Regional composting site could meet this requirement. Significant quantities of leaf and yard waste are currently collected in Region of York (over 16,000 tonnes, or approximately 8% of the residential waste stream).

Since the required levels of service are well established in most municipalities (with the exception of some smaller communities), the diversion impact of additional services that would result from implementing the 3Rs Regulations in Region of York is expected to be relatively minor.

Impacts of 3Rs Regulations on Recycling by Households in Multi-Family Buildings
The 3Rs Regulations require that owners of buildings containing six or more units in communities of greater than 5,000 provide source separation programs for residents. Municipalities are responsible for collection of the recovered material. It is assumed that some opportunities are currently available in Region of York for recycling by multi-family households (although the exact number of apartments that receive recycling service is not known). Implementation of the 3Rs Regulations is likely to increase recycling opportunities for multi-family households. The resulting diversion has been estimated assuming that 100% of multi-family households are provided with recycling opportunities (although the exact number of households in buildings containing 6 or more units is not known). Because a small proportion of the housing stock in Region of York is high-rise dwellings (15%), the impacts of this measure are expected to be relatively minor.

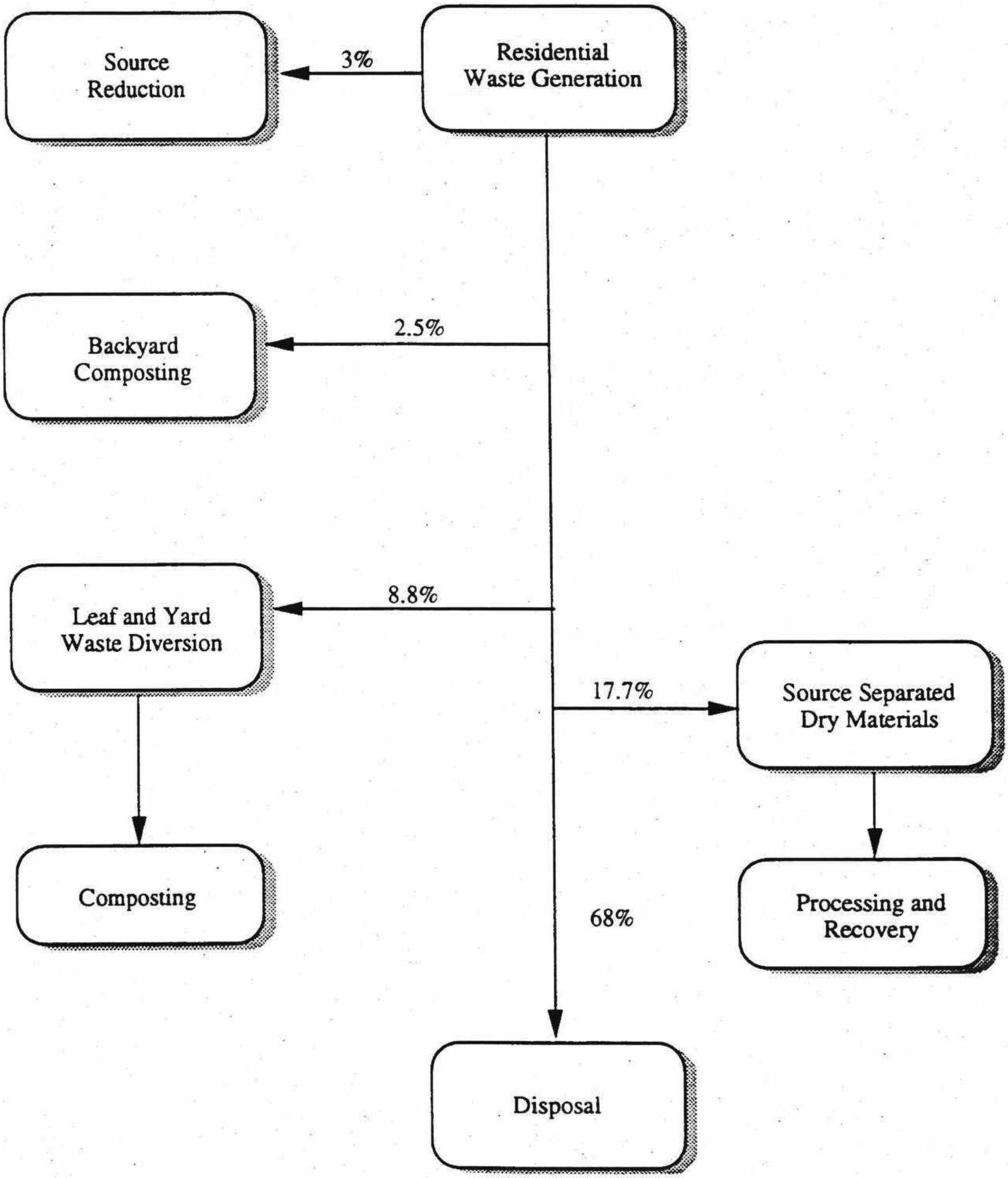
Impacts of Other Policy Commitments

The impacts of NAPP are incorporated into the diversion rates through source reduction estimates. The potential impacts of CIPSI have not been considered in the estimates.

Diversion Achieved

Diversion by the Existing/Committed system is expected to increase slightly due to the impact of increased multi-family recycling and leaf and yard waste collection. Residential diversion is estimated at 29% to 32% by the year 2000. Waste flow for the Existing/Committed System is shown schematically in Figure 8.2.

Figure 8.2
Region of York
Estimated Waste Flow
Residential System 2 — Existing/Committed



8.3 System 3 - Direct Cost

A Direct Cost system would charge a rate of $1 per bag or tag for garbage disposal by single-family households. Collection of recyclables (Blue Box) materials and leaf and yard waste collection programs would be provided at no direct charge to the householder. This system provides an economic incentive for householders to divert more dry materials through the existing Blue Box system, and more leaf and yard waste through backyard composting and separate curbside collection, and also to divert more household food wastes through backyard composters.

The Direct Cost system would impact on the behaviour of approximately 196,160 single-family households by the year 2000 (whose garbage is either disposed at the curb, or hauled to transfer stations). Multi-family households would not be impacted, as their garbage is managed by building owners and the private sector.

Backyard composters would be distributed to 80% of single-family households (156,930 composters) by the year 2000 to provide increased opportunities for diversion of household organics. It is assumed that because of the strong economic incentive to do so, up to 90% of these backyard composters would be used effectively to divert an average of 169 kg/composter/year. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

The Direct Cost System requires collection of only the materials that are collected in the Region's Existing/Committed system and does not rely on the addition of more materials or services to increase diversion. It has been assumed that one new MRF, with capacity to process 77,000 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Direct Cost System.

Diversion by the Direct Cost system is estimated at 43% to 46% by the year 2000. Waste flow for the Direct Cost System is shown schematically in Figure 8.3.

8.4 System 4 - Expanded Blue Box

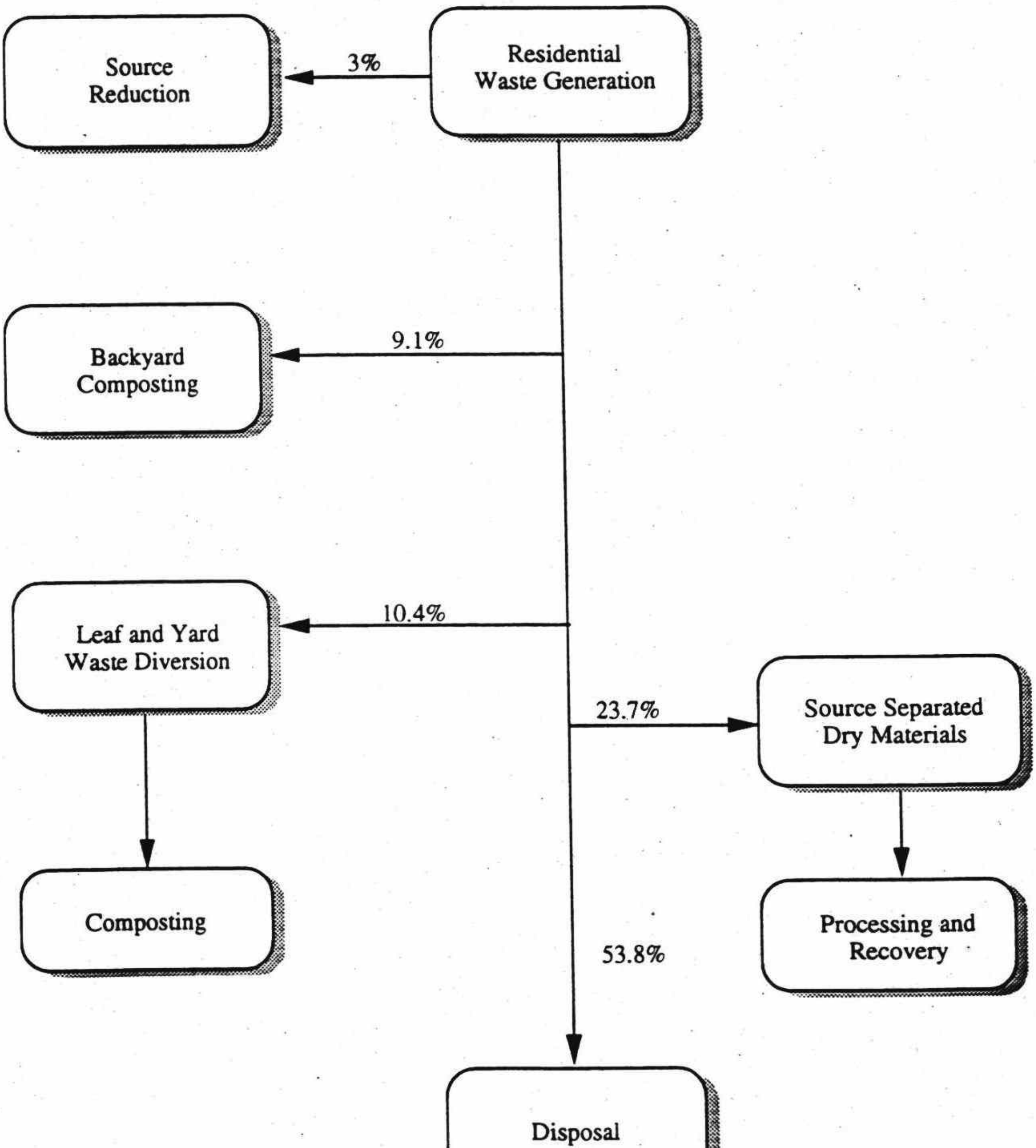
The Existing/Committed System in York Region collects:

- ONP (commingled);
- OCC;
- Telephone Directories;
- Aluminum and steel (commingled);
- Glass;
- PET;
- HDPE and other rigid plastics.

The Expanded Blue Box System would therefore require additional collection of the following materials:

- boxboard;
- polycoat (e.g. milk cartons);
- film plastic (LDPE);
- foam plastic and rigid trays (PS);
- textiles;
- mixed paper.

Figure 8.3
Region of York
Estimated Waste Flow
Residential System 3 — Direct Cost



In addition, backyard composters would be distributed to a total of 156,3930 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year.
Multi-family households would be assumed to divert dry materials at 50% the rate of single-family households. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

It has been assumed that one new MRF, with capacity to process 88,600 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Expanded Blue Box System.

Diversion by the Expanded Blue Box system is estimated at 44% to 47% by the year 2000. Waste flow for the Expanded Blue Box System is shown schematically in Figure 8.4.

8.5 System 5 - Wet/Dry

A full scale three stream wet/dry system would serve all single-family households in the Region (196,160 households) by the year 2000. Some multi-family units would also be served with wet/dry collection, depending on space availability in the buildings and on building owners' willingness to participate in the program. Multi-family units would be assumed to divert wet and dry materials at 50% of the rate of single-family households. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household/year of wet wastes.

Backyard composters would be distributed to a total of 156,930 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year.

A central in-vessel composting facility with a design capacity of 97,500 tonnes/year would be required to process collected household wet waste. It has been assumed that one new MRF, with capacity to process 88,600 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Wet/Dry System.

Diversion by the Wet/Dry system is estimated at 57% to 60% by the year 2000. Waste flow for the Wet/Dry System is shown schematically in Figure 8.5.

8.6 System 6 - Mixed Waste Processing

The Mixed Waste Processing and composting system builds on the Existing/Committed system, and processes the "third bag" of garbage (which remains after Blue Box recycling, leaf and yard waste collection and backyard composting). Some additional dry recyclables are removed and processed at the mixed waste processing and composting plant, and the remaining mixed waste stream is composted. Finished compost which meets MOEE guidelines would be marketed, but in a worst case scenario (where compost quality does not meet MOEE guidelines), it may require disposal in landfill. In either scenario, considerable mass reduction occurs in the composting process and would result in a reduction of the tonnage leaving the mixed waste composting plant.

Backyard composters would be distributed to a total of 156,930 single-family homes by the year 2000. It is assumed that 70% of these composters would be used effectively, diverting 169 kg/composter/year. In addition, an allowance for diversion of up to 54 kg/household/year by participating multi-family households (up to 50% of the total) through community/on-site composting activities has also been assumed.

Figure 8.4
Region of York
Estimated Waste Flow
Residential System 4 — Expanded Blue Box

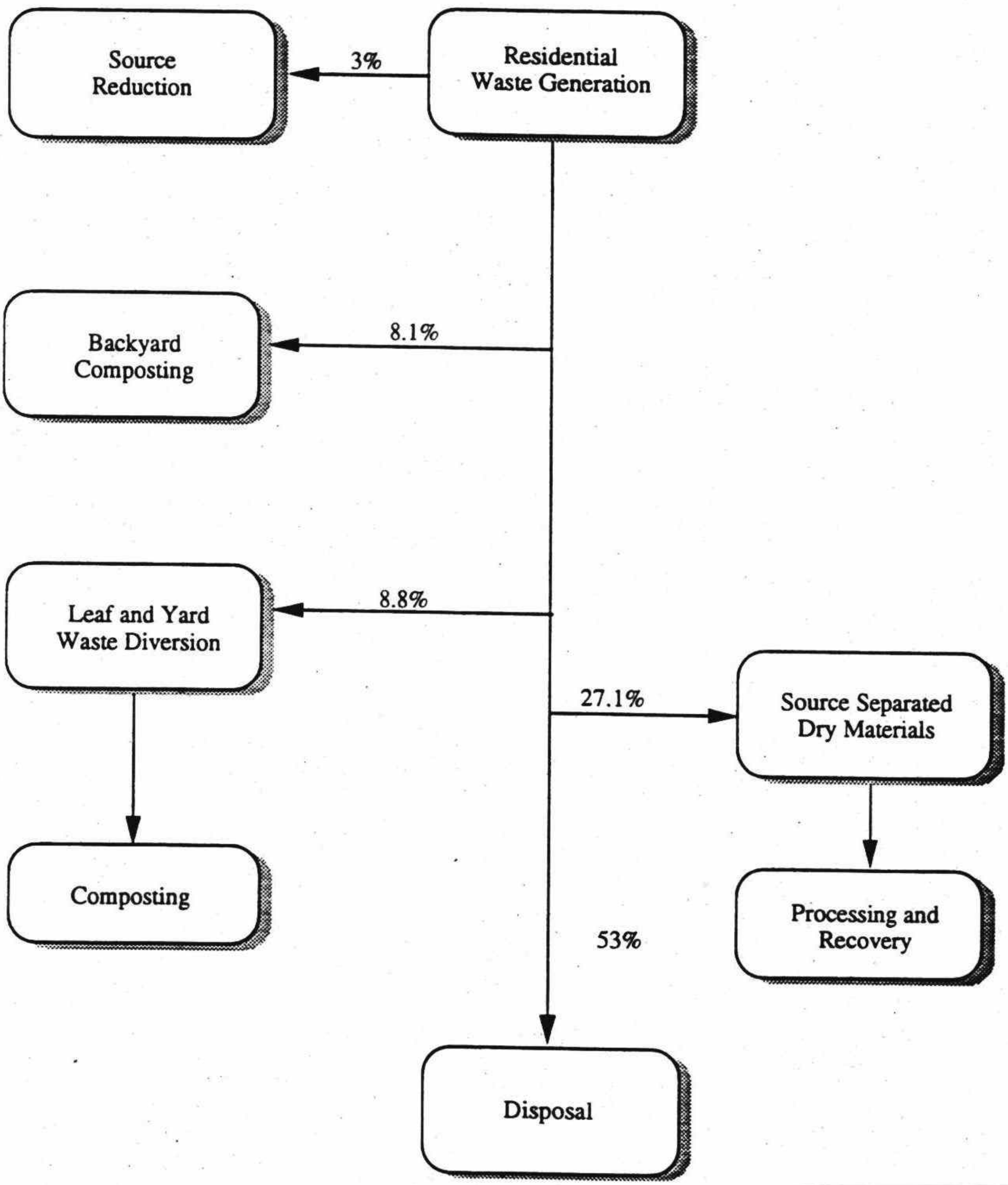
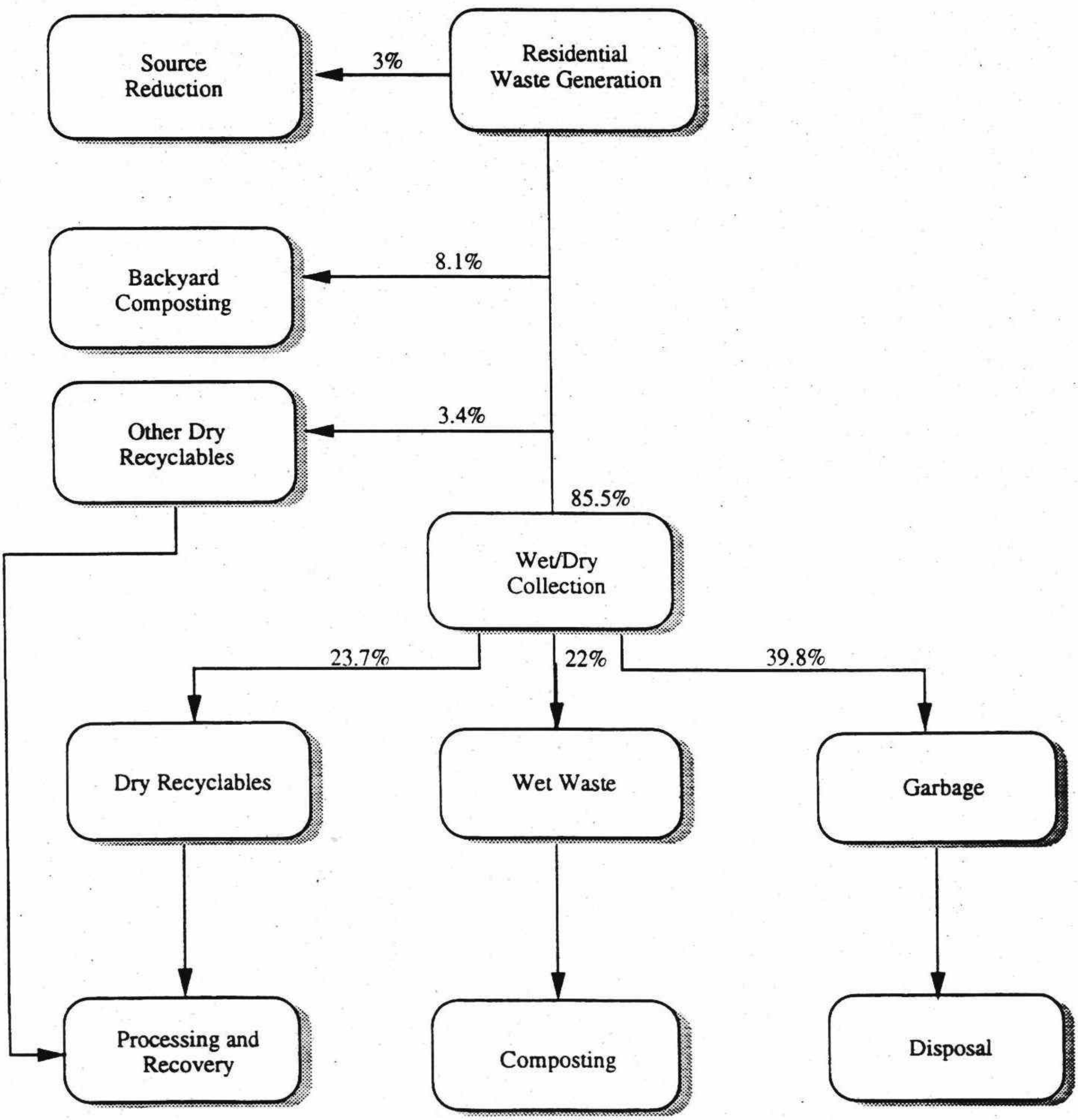


Figure 8.5
Region of York
Estimated Waste Flow
Residential System 5 — Wet/Dry



A mixed waste processing and composting plant with design capacity of 248,000 tonnes/year would be required to process mixed waste and organics. The mixed waste processing and composting plant can divert both wet and dry materials generated by multi-family households.

Multi-family households would be assumed to divert dry materials at 50% the rate of single family households. This does not have a significant impact in Region of York, as 89% of the housing stock is single-family (including semi-detached, duplexes and townhouses).

It has been assumed that one new MRF, with capacity to process 55,000 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Mixed Waste Processing System.

Diversion, by the year 2000 by the Mixed Waste Processing and composting system is estimated at:

> 59% to 62% if compost quality does not meet MOEE standards, and
> 77% to 80% if compost quality meets MOEE standards.

Waste flow for the Mixed Waste Processing System is shown schematically in Figure 8.6.

8.7 References

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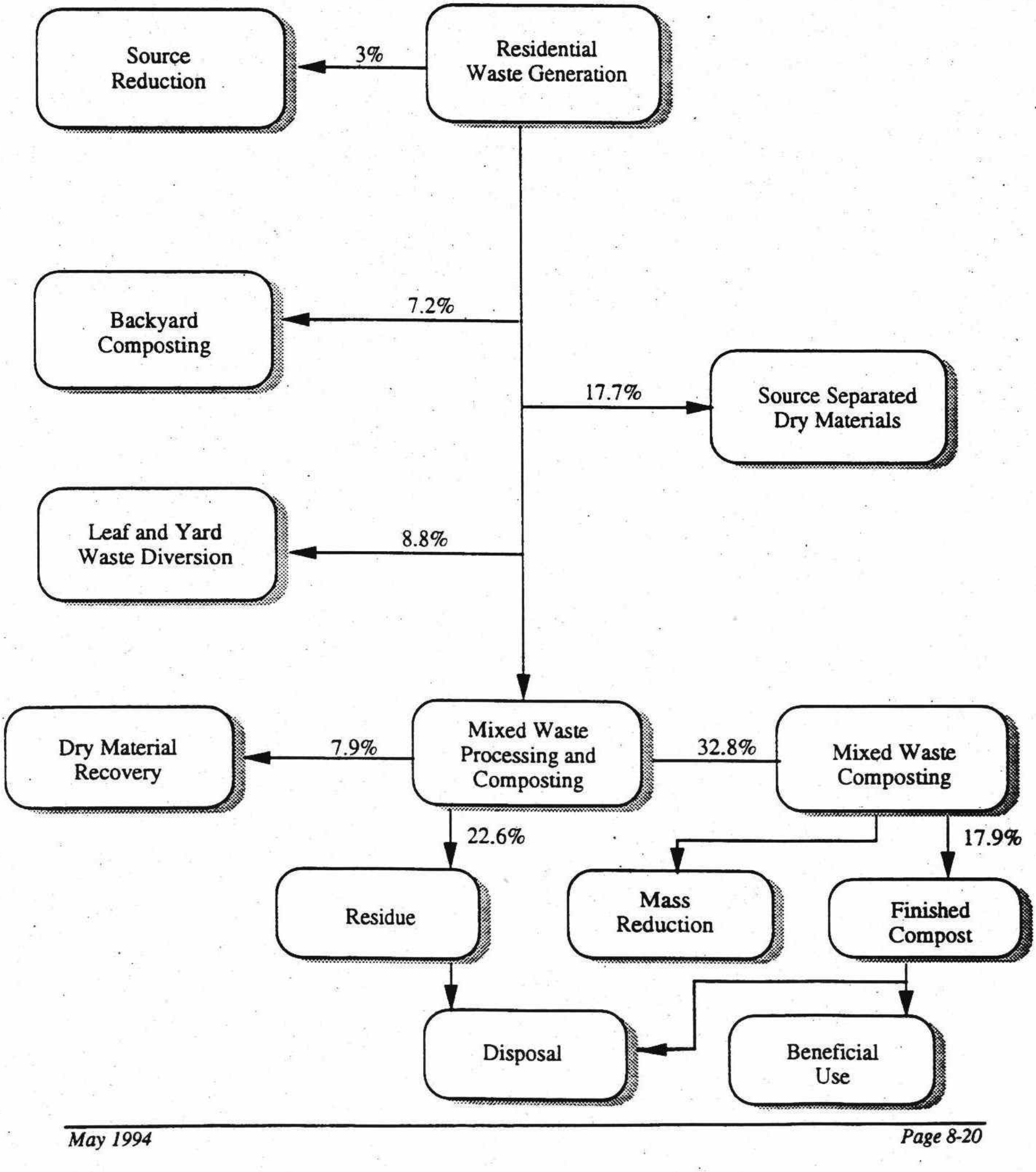
Figure 8.6
Region of York
Estimated Waste Flow
Residential System 6 — Mixed Waste Processing



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9.0 REGION OF PEEL RESIDENTIAL SYSTEM DIVERSION ESTIMATES

This chapter describes the six residential waste diversion systems and estimates of the diversion achievable by these systems as applied to the Region of Peel.

Table 9.1 presents the components of the six systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the estudy period (to accomodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

The diversion achieved by each system is summarized in Table 9.2.

Table 9.2
Estimated Residential Waste Diversion in Region of Peel in Year 2000

System	Estimated Diversion by Year 2000	
	No Source Reduction	Source Reduction
1–Existing	19%	22%
2–Existing/Committed	25%	28%
3–Direct Cost	37%	40%
4–Expanded Blue Box	38%	41%
5–Wet/Dry	51%	53%
6A–Mixed Waste Processing (Low Quality Compost)	55%	58%
6B-Mixed Waste Processing (High Quality Compost)	74%	77%

Two diversion values are presented for each system. The lower value is achievable by the year 2000 if no source reduction occurs. The higher value is achievable by the year 2000 if a 3 % level of source reduction is achieved. In all cases it is assumed that the system is fully operational and mature by the year 2000.

Table 9.3 presents the estimated tonnages of material diverted by each system (using 1992 data).

The Region is expected to have predominantly single-family housing (72.5% – including semi-detached, duplexes and town houses) in the future. By the year 2000, housing in the Region is expected to consist of the following housing mix (HSA, 1994):

single-family detached	155,302	(50% of total);
semi & low rise	84,026	(27% of total);
high rise dwellings	69,944	(23% of total);
Total Households (year 2000):	309,272.	

Table 9.1
Peel Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of garbage to landfills and transfer stations by rural residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of garbage to landfills and transfer stations by rural residents. • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of garbage to landfills and transfer stations by rural residents • *Direct cost system for garbage collection.* • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self haul of garbage to landfills and transfer stations by rural residents. • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection** • *Curbside collection of residential waste from single family dwellings in three streams by specially designed tucks by municipal forces or contractors to municipalities.* • *Collection of residential garbage from multi-family units in three streams, where feasible by municipal forces or private contractors.* • Self haul of garbage to landfills and transfer stations by rural residents. • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Self-haul of garbage to landfills and transfer stations by rural residents • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads
Residential Recycling and Collection • Curbside collection of Blue Box materials from single family dwellings and some apartment buildings. Typical materials include at least ONP, PET, glass, ferrous, aluminum (Caledon), these and telephone directories in Brampton • Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Curbside collection of Blue Box materials from single family dwellings and some apartment buildings includes all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations* • Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) • *Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations)* • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • Curbside collection of Blue Box materials from single family dwellings and some apartment buildings includes all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • Collection of bins of recyclables from multi-family units	**Residential Recycling and Collection** • *Curbside collection of Expanded Blue Box materials including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • *Recycling services for full range of Expanded Blue Box materials at all multi-family buildings with 6 or more units* • *Collection of bins of recyclables (collecting all Expanded Blue Box materials) from multi-family units*	**Residential Recycling and Collection** • *Provide carts to all single family and some "other" households.* • *Separation of waste into three streams (wet, dry and garbage) by the householder.* • *Expanded set of dry materials to be collected, including plastics, (PET, rigid plastic, bottles & tubes, film plastic, foam plastic and rigid trays); paper fibre (ONP, OCC, boxboard, polycoat, phone books, magazines and catalogues and mixed household paper); metal (steel and aluminum cans, aluminum trays and foil), clear and coloured glass and textiles* • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • *Large bins provided in the garbage management area of multi-family buildings, where space available. Residents will be encouraged to separate their waste into three separate bags*	**Residential Recycling and Collection** • Curbside collection of Blue Box materials from single family dwellings and some apartment buildings includes all materials designated basic Blue Box waste and at least two materials designated as supplementary Blue Box waste in the 3Rs Regulations • Expanded curbside collection (Mississauga) to collect additional materials (HDPE, mixed plastic, textiles, OMG, OCC) • Recycling services at all multi-family buildings with 6 or more units (3Rs Regulations) • Collection of bins of recyclables from multi-family units

Table 9.1
Peel Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Recycling Depots and Transfer Stations • Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill • Depots located at transfer stations to provide recycling opportunities to self-haul generators • Drop-off depots for multi-family residents not serviced by recycling • Drop-off depots for rural households	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill • Depots located at transfer stations to provide recycling opportunities to self-haul generators • Drop-off depots for multi-family residents not serviced by recycling. • Drop-off depots for rural households • 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. • Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill • Depots located at transfer stations to provide recycling opportunities to self-haul generators • Drop-off depots for multi-family residents not serviced by recycling • Drop-off depots for rural households • 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste • Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill • Depots located at transfer stations to provide recycling opportunities to self-haul generators • *Drop-off depots for multi-family residents not serviced by recycling, for full range of Expanded Blue Box materials.* • *Drop-off depots for rural households (collecting all Expanded Blue Box materials)* • 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste • Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill • Depots *located at compost facility* to provide recycling opportunities to self-haul generators • Drop-off depots for multi--family residents not serviced by recycling • Drop-off depots for rural households • 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. • Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots)	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables (including all banned materials) at Britannia landfill • Depots located at transfer stations to provide recycling opportunities to self-haul generators • 7 community recycling centres: 3 in Mississauga, 2 in Brampton, and 2 in Caledon, to accept recyclables, household hazardous waste, reusable items and residential waste. • Construction of satellite drop-off facilities for recycling (Neighbourhood Recycling Depots and Mini Recycling Depots)
Residential Leaf and Yard Waste Collection • Limited seasonal curbside collection of leaf and yard waste	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • May be some drop-off depots for leaf and yard waste (3Rs Regulations)	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • May be some drop-off depots for leaf and yard waste (3Rs Regulations)	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • May be some drop-off depots for leaf and yard waste (3Rs Regulations)	**Residential Leaf and Yard Waste Collection** • *Collection of leaf and yard waste as part of three stream pick-up* • *Separate brush collection* • May be some drop-off depots for leaf and yard waste (3Rs Regulations)	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • May be some drop-off depots for leaf and yard waste (3Rs Regulations)
Residential Household Composting • Backyard composter distribution programs (56,839 units to end of 1992) • Limited community composting • Limited vermicomposting	**Residential Household Composting** • Backyard composter distribution programs (56,839 units to end of 1992) • Backyard composters to be used in 68,839 single family households, an addition of 12,000 to existing system • Additional community composting • Additional vermicomposting	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes.* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes.* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*	**Residential Household Composting** • *Door to door distribution of backyard composters to 80% of single family households.* • *Large 3-bin composting units distributed to apartment and co-operative housing complexes.* • *Promotion of vermicomposting to multi-family units* • *Promotion of community composting*

Table 9.1
Peel Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.) • Special curbside collections of Christmas trees • Special curbside collections of white goods • Drop-off depots for white goods • Once a year HHW collection at Bolton Community Centre • Permanent drop-off depot for HHW at the Britannia Road landfill	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)** • Special curbside collections of Christmas trees • Special curbside collections of white goods • Drop-off depots for white goods • Once a year HHW collection at Bolton Community Centre • Permanent drop-off depot for HHW at the Britannia Road landfill	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)** • Special curbside collections of Christmas trees following the Christmas season • Special curbside collections of white goods • Drop-off depots for white goods • Once a year HHW collection at Bolton Community Centre • Permanent drop-off depot for HHW at the Britannia Road landfill	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)** • Special curbside collections of Christmas trees • Special curbside collections of white goods • Drop-off depots for white goods • Once a year HHW collection at Bolton Community Centre • Permanent drop-off depot for HHW at the Britannia Road landfill	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)** • Special curbside collections of Christmas trees following the Christmas season • Special curbside collections of white goods • Drop-off depots for white goods • Once a year HHW collection at Bolton Community Centre • Permanent drop-off depot for HHW at the Britannia Road landfill	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.)** • Special curbside collections of Christmas trees • Special curbside collections of white goods • Drop-off depots for white goods • Once a year HHW collection at Bolton Community Centre • Permanent drop-off depot for HHW at the Britannia Road landfill
Composting Facilities • Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill)	**Composting Facilities** • Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill)	**Composting Facilities** • Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill)	**Composting Facilities** • Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill)	**Composting Facilities** • Existing centralized windrow leaf and yard waste composting facilities may be closed • *Central composting facilities (in vessel) for composting of source separated household organics (wet stream) and leaf and yard waste*	**Composting Facilities** • Centralized windrow composting of leaf and yard waste (at Brampton site, Britannia Road landfill and Caledon landfill) • *New mixed waste processing and composting facility*
Reuse Centres and Activities • Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) • Food reuse organization (such as Second Harvest)	**Reuse Centres and Activities** • Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) • Food reuse organization (such as Second Harvest)	**Reuse Centres and Activities** • Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) • Food reuse organization (such as Second Harvest)	**Reuse Centres and Activities** • Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) • Food reuse organization (such as Second Harvest)	**Reuse Centres and Activities** • Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) • Food reuse organization (such as Second Harvest)	**Reuse Centres and Activities** • Municipal reuse centre (Caledon Landfill scavenging centre, Albion & Brampton goods exchanges) • Charitable reuse centres run by social service organizations (Goodwill, Salvation Army, etc.) • Food reuse organization (such as Second Harvest)

Table 9.1
Peel Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
MRFs • Mississauga processing centre (MRF) for dry recyclables collected from the residential (and minor amounts from the commercial/institutional) sector in Mississauga and Brampton. Owned and operated by Laidlaw under contract to the Region • MRF/Transfer Station in Bolton for Caledon material • *One new Regional MRF for processing of dry recyclables (to meet 20 year requirement)*	**MRFs** • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • *One new Regional MRF for processing of dry recyclables (to meet 20 year requirement)*	**MRFs** • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • *One new Regional MRF for processing of dry recyclables (to meet 20 year requirement)*	**MRFs** • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • *One new Regional MRF for processing of dry recyclables (to meet 20 year requirement)*	**MRFs** • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • *One new Regional MRF for processing of dry recyclables (to meet 20 year requirement)*	**MRFs** • Laidlaw MRF will remain open but will not be part of the residential system • MRF/Transfer Station in Bolton for Caledon material • *One new Regional MRF for processing of dry recyclables (to meet 20 year requirement)*
Residential Promotion and Education • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • *Promotion/education on Direct cost program* • *Promotion/education program on source reduction, pre-cycling, composting reuse and recycling*	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • *Promotion/education on Expanded Blue Box program.* • *Promotion/education program on source reduction, pre-cycling, composting reuse and recycling*	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • *Promotion/education for wet/dry system* • *Promotion/education for source reduction/pre-cycling/composting/reuse/recycling*	**Residential Promotion and Education** • 3Rs promotion and education program, focused on the residential sector. • Consumer education program to reduce waste generation, includes videos, posters, calendars, pamphlets, advertisements etc • *Promotion/education for source reduction, pre-cycling, composting, reuse and recycling*

Table 9.3
Region of Peel
Residential System Diversion Estimates
1992

Component	Existing System Diversion (tonnes)	Existing/ Committed Diversion (tonnes)	Direct Cost System Diversion (tonnes)	Expanded Blue Box Diversion (tonnes)	Wet/Dry System Diversion (tonnes)	MSW (compost landfilled) (tonnes)	MSW (compost marketed) (tonnes)
Total Residential Waste (tonnes)	59,967	78,457	115,156	119,896	161,111	172,811	232,792
Paper							
Newspaper	21,534	21,986	35,745	38,339	38,339	41,060	50,557
Corrugated cardboard (OCC)	1,234	1,260	4,028	4,550	4,550	6,287	7,787
Telephone Directories	712	727	770	741	741	821	849
Mixed paper	469	479	479	5,907	5,907	24,184	42,976
Subtotal (Paper)	23,949	24,452	41,022	49,538	49,538	72,353	102,170
Glass	6,674	6,814	9,279	9,743	9,743	8,663	8,663
Tinplate Steel (ferrous)							
Aluminum (non-ferrous)							
Subtotal Metal (Commingled)	6,137	6,266	7,761	8,043	8,043	12,134	12,134
Plastic							
PET			400	476	476		
HDPE			467	555	555		
Other Plastic			0	2,160	2,160		
Subtotal (Plastic)	694	709	867	3,190	3,190	1,613	1,613
Organics							
Food wastes	6,532	7,911	15,977	14,396	49,894	38,080	63,345
Yard waste	10,735	27,059	35,004	29,287	35,004	33,201	37,859
Subtotal (Organics)	17,267	34,970	50,982	43,684	84,898	71,281	101,203
Wood Waste	2,490	2,490	2,490	2,490	2,490	2,495	2,499
Construction/Demolition Waste	142	142	142	142	142	379	615
Disposable Diapers						0	0
Textiles/Leather/Rubber	390	390	390	842	842	1,670	1,670
Other	2,224	2,224	2,224	2,224	2,224	2,224	2,224
Subtotal (Wood - Other)	5,246	5,246	5,246	5,698	5,698	6,767	7,008
TOTAL	**59,967**	**78,457**	**115,156**	**119,896**	**161,111**	**172,811**	**232,792**
Diversion Estimate =	**19%**	**25%**	**37%**	**38%**	**51%**	**55%**	**74%**

The housing mix impacts on the extent to which different diversion components are effective, as described in Chapter 5.0. This impact is more pronounced in Region of Peel than in the Regions of York and Durham, due to the higher level of multi-family households (27.5% - including low rise), relative to single-family households. In this Region, Systems 3, 4 and 5 do not lead to the same increased levels of potential diversion that are seen in other Regions because they rely on increased diversion from components that are most applicable to single-family households (e.g. behavioural changes due to direct costs applied to waste disposal). These differences are highlighted in the system descriptions below.

A full description of the methodology used to estimate residential waste diversion is described in Chapter 5.0. Features and results specific to the Region of Peel are discussed in this chapter.

9.1 System 1 - Existing

Information on residential waste diversion activities was obtained from the following sources:

- survey of regional and municipal staff, February-March 1993;
- on-going discussions with regional and municipal staff, February-October, 1993;
- miscellaneous reports to council, internal memoranda, etc. which are referenced at the end of this chapter.

In 1992, an estimated 313,296 tonnes of residential waste were generated in Peel. Of this, 59,967 tonnes were diverted and 253,329 tonnes were disposed.

Residential recycling services in place as at December 31, 1992 consisted of the following activities:

- residential curbside recycling services to 228,300 households;
- drop-off depots at Britannia Road landfill;
- 56,840 backyard composters;
- leaf and yard waste composting site in Brampton;
- composting area at Britannia Road landfill site;
- compost demonstration site for pilot wet/dry projects;
- compost area at Caledon landfill;
- a Regional salvage centre in Caledon;
- Albion Reusable Goods Exchange;
- Williams Parkway Reusable Goods Exchange in Brampton;
- one permanent household hazardous waste depot at the Britannia Road landfill;
- once-a-year HHW collection at Bolton Community Centre;
- HHW depot located in City of Brampton;
- drop-off depot for white goods in Caledon;
- curbside pick-up of white goods in Brampton and Mississauga;
- extensive promotion and education program;
- MRF/transfer station in Bolton for Caledon material;
- Recyclable material processing at the Laidlaw MRF in Mississauga for Mississauga and Brampton material.

Residential waste diversion was made up of the following activities:

Blue Box curbside	34,867 tonnes
Dry Recyclables from depots	5,793 tonnes
Other Dry Recyclables diverted	1,375 tonnes
Leaf and yard waste	7,661 tonnes

Household wet waste through backyard composters	9,606 tonnes
Household Hazardous Waste	665 tonnes
Total diverted 1992	59,967 tonnes.

This information is summarized in Table 9.4. A more detailed description of diversion activities is presented in the text below. References for the information presented are contained in Section 9.7.

Residential Recycling and Collection

In 1992, total of 40,660 tonnes of dry recyclables were collected from both the residential curbside and depot recycling collection programs which included the following material breakdown:

- 21,534 tonnes of ONP and OMG (commingled);
- 1,234 tonnes of OCC;
- 712 tonnes of Telephone Directories;
- 469 tonnes of mixed paper;
- 6,137 tonnes of Aluminum and Steel (commingled);
- 6,674 tonnes of Glass;
- 694 tonnes of plastic;
- 3,206 tonnes of metal, wood, tires, textiles, etc.

One drop-off site is maintained at the Britannia Landfill, where residential recyclables, ferrous metal, wood waste, drywall, paper and plastic and other materials which have been banned are collected. In 1992, 5,793 tonnes of recyclable materials were collected from these drop-off depots.

Residential Household Composting

In 1992 the program was updated to allow for the sale of subsidized backyard composters through established retail operations.

An estimated 56,840 backyard composters had been distributed in the Region of Peel by the end of 1992, providing coverage of 33% of single-family households.

To maintain the same coverage rate in the year 2,000, an additional 17,400 backyard composters (for a total of 74,240 units) would be needed.

Residential Leaf and Yard Waste Collection/Composting Facilities

Curbside collection of leaf and yard waste is limited in Region of Peel. In 1992, curbside collection of "green" waste in the Region of Peel totaled 7,661 tonnes. The City of Brampton collects leaves only in the fall, and some leaf and yard waste collection occurs in the urban areas of Caledon. The City of Mississauga carries out a limited degree of management of leaf and yard waste.

Leaf and yard waste is processed in 3 centralized windrow composting facilities including one in Brampton, one at the Britannia Road landfill and one at the Caledon landfill. In 1992, the Region conducted an experiment at the Britannia Road landfill where, instead of composting, the leaves were mixed in with topsoil. The maximum staffing at any of the sites is 2 people.

Table 9.4
Region of Peel
Summary of Existing Residential Waste Diversion System Performance
1992

Regional Characteristics	
Regional Population	755,178
Total Number of Households	236,775
— single-family detached	117,152
— high rise	55,039
— semi and low rise	64,584
Households served by curbside	228,300
Number of backyard composters distributed	56,839
Residential Material Diverted in 1992	
Blue Box	34,867 tonnes
Depots (Blue Box materials)	5,793 tonnes
Depots (other materials)	2,040 tonnes
Leaf and yard waste collection and composting	7,661 tonnes
Diversion through backyard composters	9,606 tonnes
Total residential waste diverted	59,967 tonnes
Residential waste diversion summary	
Residential waste generated	313,296 tonnes
Residential waste diverted	59,967 tonnes
Residential waste disposed	253,329 tonnes
Residential waste diversion rate	19.1%

Sources: Social Environment Technical Appendix, May, 1994.
Regional and Municipal Staff, 1993
Reports to Council.

Other Residential Waste Diversion

Reuse Activities: The Region of Peel operates a salvage centre in Caledon that accepts old furniture, appliances and any non-hazardous material. Residents are encouraged to bring goods and take items home with them free of charge. The salvage centre includes a textile drop-off box for Goodwill. Approximately 3,500 items were brought to the site in 1992, of which 86% were reused by residents. Municipal officials estimate that the salvage centre diverted approximately 75 tons of material from landfill in 1992 (Chubb, 1993).

There are two additional re-use centres operating in the Region, including:

- the **Albion Reusable Goods Exchange** which diverted approximately 194 tons of waste in 1992;
- the **Williams Parkway Reusable Goods Exchange** in Brampton which diverted over 31 tons of waste in 1992 (Stewart, 1993).

Household Hazardous Waste (HHW) Program: The Region operates one large permanent HHW depot at the Britannia landfill and a once-a-year HHW collection at the Bolton Community Centre. A third HHW collection site in Albion closed in 1992 pending full MOEE approval. In addition to the Regional facilities, a HHW depot is located in the City of Brampton. The depots are operated on behalf of the Region of Peel and member municipalities by Laidlaw Environmental Services.

The following wastes were collected at the depots or on waste collection days:

- 385 tonnes of Household Hazardous Waste ;
- 2,240 Propane Tank units;
- 168 tonnes of Motor Oil ;
- 7,258 Car Battery units.

White Goods: Caledon provides a drop-off depot for white goods. Weights of material diverted were not available. Brampton offers daily white goods pickup as well as a drop-off depot. This led to diversion of 381 tonnes (215 tonnes scrap metal/166 tonnes reuse) in 1992. Mississauga offers curbside pick-up of white goods, capturing approximately 507 tonnes in 1992.

Residential Promotion and Education

Region of Peel has had an extensive promotion/education program on waste reduction and diversion in place for some time. In 1992, a brochure about backyard composting was published and distributed to approximately 185,000 non-apartment households. Newspaper advertisements have been utilized, and a hotline is available for composting information. The Region also runs an extensive IC&I waste reduction campaign.

Public Sector Material Recycling Facilities (MRFs)

Two MRFs operate in the Region, which include:

- one public sector MRF/transfer station that is operated in Bolton for Caledon. It operates 8 hours/day, 2 days per week, for a total of 832 operating hours per year. It accepts ONP, PET, glass, aluminum and steel cans which are inventoried and sold directly to brokers. The facility, which is operated by 2 staff, reports an approximate 1% residue rate (Moffat, March 1993). Its' current annual throughput is 2,087 tonnes;

- the Laidlaw-Mississauga MRF, which processes all material collected from municipal curbside and apartment recycling programs in Mississauga and Brampton, in addition to materials from the IC&I sector. It began operation in 1986 and processes fibre (ONP, OCC, OMG and telephone directories), container materials (glass, plastics, cans, etc.), and textiles. The annual design throughput capacity is 33,000 tonnes/year, and the facility was reported to be operating at capacity (with processing of IC&I in addition to residential recyclables). The facility is 22,500 square feet in size and operated 16 hours, 5 days per week with a staff of 8 per shift in 1992.

  In 1992, the MRF processed 23,172 tonnes of residential recyclables. Of this, approximately 5% was residue and non-recyclable materials.

It has been assumed that one new MRF, with capacity to process 59,000 tonnes of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Existing System.

Diversion Achieved

Residential diversion by the Existing System was estimated at 19.1% in 1992. Waste flow for the Existing System is shown schematically in Figure 9.1.

9.2 System 2: Existing/Committed

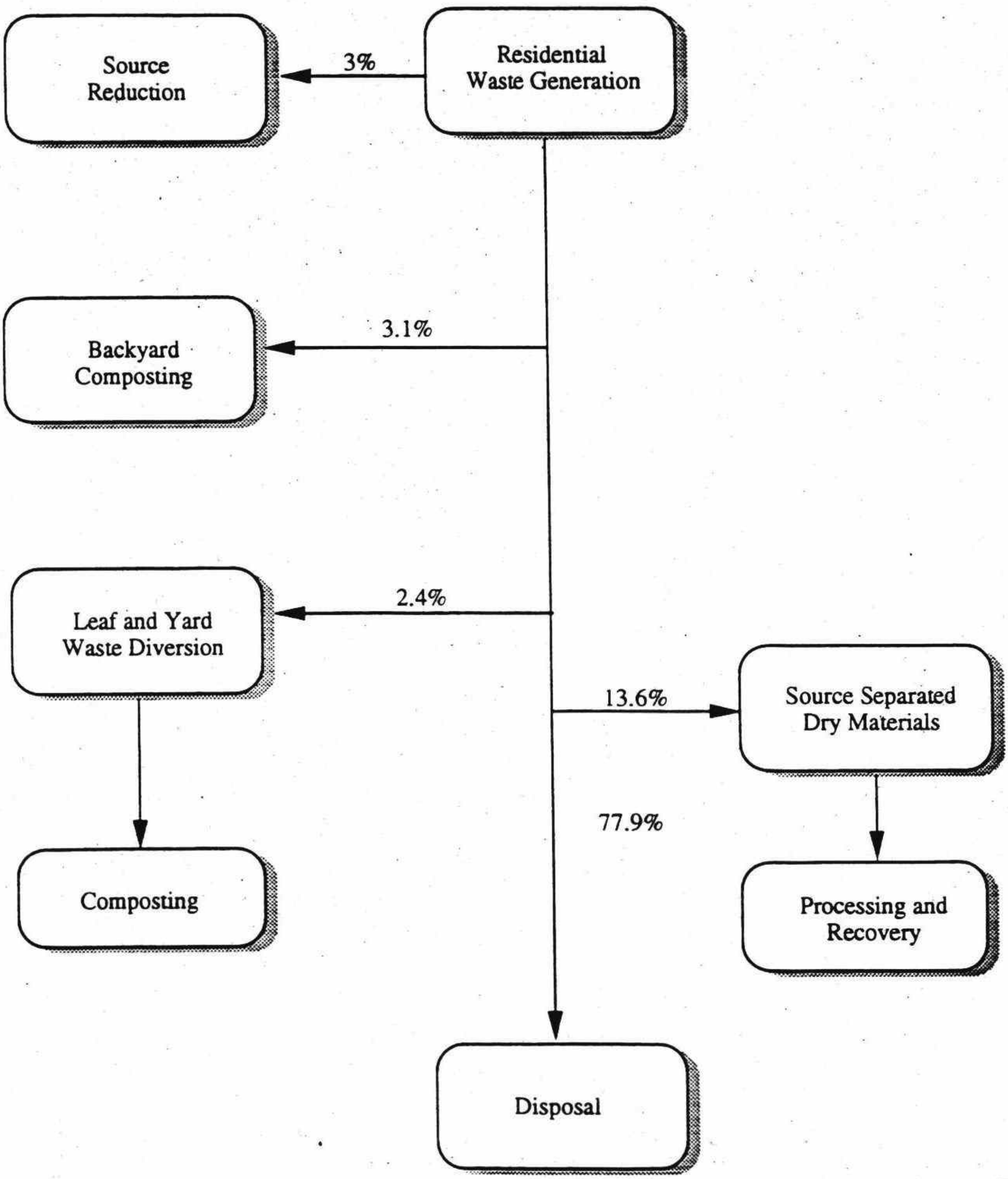
In general, the Existing/Committed system includes:

- all facilities and programs committed in the Region's most recent five year capital funding budgets (1993 to 1997 or 1994 to 1998 if available);
- impacts of the provincial 3Rs regulations (described in Chapter 5.0); and
- impacts of any other policy commitments at the local, regional, provincial or federal level, which had been announced by the end of 1992.

The Region commissioned a study (Cave, 1994) on expanding the range of diversion options available to residents. The study has outlined a plan for construction of a series of seven Community Recycling Centres (CRCs), with a network of 12 Neighbourhood Recycling Depots (NRDs) (not including those at CRCs), and a network of mini-depots sited in public areas. Additional diversion through these facilities was based on the data in the report and discussions with Regional staff (Williams, 1994). The report also estimated the cost of constructing a new MRF to be owned by the Region. The report was accepted by council after the 1994-1998 budget estimates had been approved. For this analysis, it was assumed that construction of all of these facilities would be included in the Existing/Committed System, and the most recent cost estimates (Cave, 1994) were used. The contract for collection and processing of dry recyclables for the City of Mississauga (and possibly Brampton and Caledon) will be awarded in May 1995.

The tendering process is under discussion at this time. Prices will be sought for a number of options including weekly and bi-weekly collection. In addition, incremental costs of collecting various materials will be submitted as part of each contractors' bid. Disentanglement of waste collection responsibilities to the Regional level of government (it is currently managed at the municipal level) is also under discussion. Because of the number of issues which are unresolved at this time, staff could not confirm what the committed system in Region of Peel is likely to be (Markle, 1994. Williams, 1994).

Figure 9.1
Region of Peel
Estimated Waste Flow
Residential System 1 — Existing



For this reasons, it was assumed that the Existing/Committed system would continue to collect the materials collected by the Existing system. Capital costs of the Existing/Committed system include:

- $12,300,000 to construct a new MRF to process 60,500 tonnes/year of residential recyclable materials from Blue Box collection, community recycling centres and new mini-depots. Note that this facility costs less than the one in a recent Regional report, but has been sized to meet the 20-year needs of the Existing/Committed System on a 2 shift/day, 250 day/year basis. (Cave, 1994, Williams, 1994);

- $29,000,000 is estimated for construction of 7 community recycling centres (Cave, 1994, Williams, 1994).;

- $720,000 was allocated to provide an additional 12,000 backyard composters for home composting (in 1993 capital and operating budget).

In order to maintain the 38.8% coverage rate for backyard composters in the year 2000, an additional 18,130 units will be needed.

The City of Mississauga has been the host community for an extensive demonstration project on Wet/Dry collection of household waste for some time. Some of the study documentation was made available to the study team following a meeting with City of Mississauga staff on March 7, 1994. Discussions with staff indicate that City of Mississauga is in favour of a three stream collection approach starting with leaf and yard waste, and adding food waste to the wet stream at a later date (MacDonald, 1994). The timing for implementation of the three stream system is uncertain at this time, as the new recycling collection contract has not been awarded. Dates of 1998 or 2002 have been discussed as possibilities.

Because of the uncertainty involved, three stream collection of source separated household waste was not included in the Existing/Committed system.

Impacts of the 3Rs Regulations

Single Family Households
The Region of Peel consists of three municipalities. Two of these have populations of greater than 50,000 (Brampton and Mississauga), while Caledon has a population between 5,000 and 50,000.

Region of Peel municipalities would be included in the 3Rs regulations, and would therefore be required to:

- provide recycling services to parallel garbage collection service (curbside or depot);

- collect a list of "basic Blue Box" materials as well as two others; and

- provide backyard composting programs.

This level of service is currently in place in Mississauga. Mississauga collects the designated materials (ONP, aluminum, glass, steel and PET food and beverage containers) in addition to OCC, OMG, HDPE, mixed plastics and textiles. Brampton and Caledon collect fewer materials (ONP, PET, glass, ferrous and aluminum with the addition of telephone directories in Brampton). Both will need to add supplementary materials to the list presently collected to comply with the 3Rs Regulations. This will result in additional waste diversion.

Under the regulations, all municipalities of greater than 50,000 (Brampton and Mississauga) are also required to provide leaf and yard waste collection programs. Other municipalities (between 5,000 and 50,000), that have leaf and yard waste collection programs are required to compost the material collected. In the Region of Peel, leaf and yard waste collection is limited. Brampton and Mississauga will be required to provide some additional services for leaf and yard waste. The 3Rs Regulations stipulate that this service should be "reasonably convenient" and can include drop-off depots. The increased diversion resulting from this requirement was estimated assuming that recovery of leaf and yard wastes will increase to approximately 60%.

Impacts of 3Rs Regulations on Recycling by Households in Multi-Family Buildings
Recycling services were provided to an estimated 228,300 single, multi-family and rural households in 1992. Based on this it was assumed that 85% of multi-family residences received some form of recycling service in 1992. The 3Rs Regulations require that owners of buildings containing six or more units in communities of greater than 5,000 provide source separation programs. Collection of the source separated material is the responsibility of the municipality. Many opportunities are currently available in the Region of Peel for recycling by multi-family households. Implementation of the 3Rs Regulations is likely to increase recycling opportunities for multi-family households and increase diversion, since a significant portion of households are multi-family units. The resulting diversion has been estimated assuming that 100% of multi-family households are provided with recycling opportunities (although the exact number of households in buildings containing 6 or more units is not known).

Impacts of Other Policy Commitments

The impacts of NAPP are incorporated into the diversion rates through source reduction estimates. The potential impacts of CIPSI have not been considered in the estimates.

Diversion Achieved

Diversion by the Existing/Committed System is estimated at 25% to 28% by the year 2000. Waste flow for the Existing/Committed System is shown schematically in Figure 9.2.

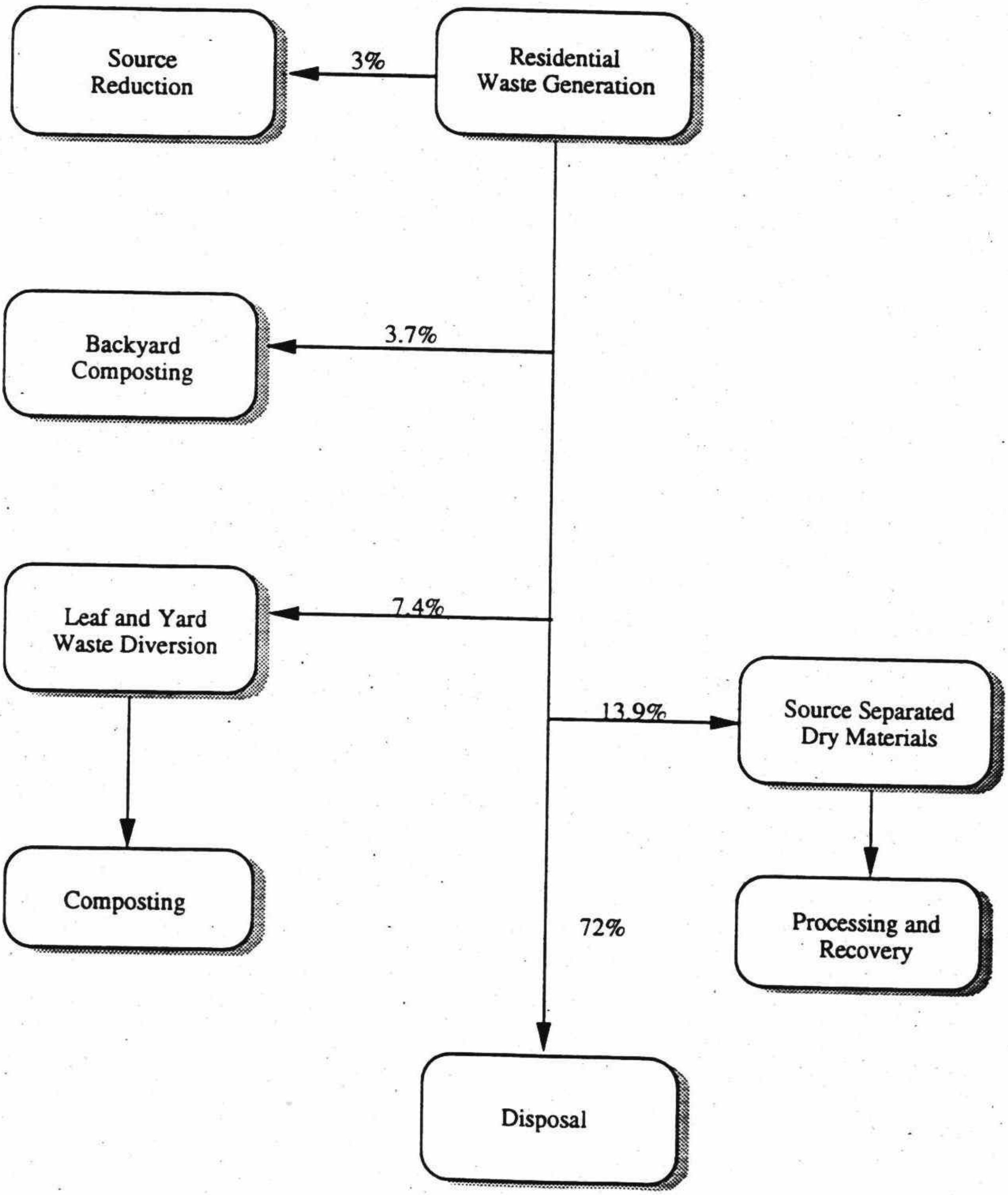
9.3 System 3 - Direct Cost

A Direct Cost system would charge a rate of $1 per bag or tag for garbage disposal by single-family households. Collection of Recyclables (Blue Box) and leaf and yard waste collection programs would be provided at no direct charge to the householder. This system provides an economic incentive for householders to divert more dry materials through the existing Blue Box system, leaf and yard waste through backyard composting and separate curbside collection, and also to divert household food wastes through backyard composters.

The Direct Cost system would impact on the behaviour of 224,220 single-family households by the year 2000 (whose garbage is either disposed at the curb, or hauled to transfer stations). It was assumed for diversion estimates that multi-family households would not be impacted, as their garbage is managed by building owners and the private sector.

Backyard composters would be distributed to 80% of single-family households (179,380 households) by the year 2000 as part of this system to provide increased opportunities for voluntary diversion of wet waste. It is assumed that because of the strong economic incentive to do so, up to 90% of these backyard composters would be used effectively to divert 169 kg/composter/year. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household year of wet wastes.

Figure 9.2
Region of Peel
Estimated Waste Flow
Residential System 2 — Existing/Committed



The Direct Cost System requires collection of only the materials that are collected in the Region's Existing/Committed system and does not rely on the addition of more materials or services to increase diversion. Discussions with Regional and municipal staff indicate that implementation of a Direct Cost system is under consideration, but may take a number of years to implement (MacDonald, 1994, Williams, 1994)

It has been assumed that one new MRF, with capacity to process 93,000 tonnes of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Direct Cost System.

Diversion by the Direct Cost system is estimated at 37% to 40% by the year 2000. Waste flow for the Direct Cost System is shown schematically in Figure 9.3.

9.4 System 4 - Expanded Blue Box

With some municipal variations, the Existing/Committed System in the Region of Peel collects:

- ONP;
- PET;
- Aluminum and steel;
- Glass;
- PET
- OCC, HDPE, mixed plastics and textiles (Mississauga)
- Telephone Directories (Brampton);.

The Expanded Blue Box System would therefore require that all municipalities provide for collection of all of the following materials:

- boxboard;
- polycoat (e.g. milk cartons);
- magazines and catalogues (OMG);
- other rigid plastic bottles & tubes (HDPE, PVC, PP, LDPE);
- film plastic (LDPE);
- foam plastic and rigid trays (PS);
- textiles;
- mixed paper.

In addition, backyard composters would be distributed to a total of 179,380 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year.

Multi-family households would be assumed to divert dry materials at 50% the rate of single family households. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household year of wet wastes.

It has been assumed that one new MRF, with capacity to process 111,200 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Expanded Blue Box System.

Diversion by the Expanded Blue Box System is estimated at 38% to 41% by the year 2000. Waste flow for the Expanded Blue Box System is shown schematically in Figure 9.4.

Figure 9.3
Region of Peel
Estimated Waste Flow
Residential System 3 — Direct Cost

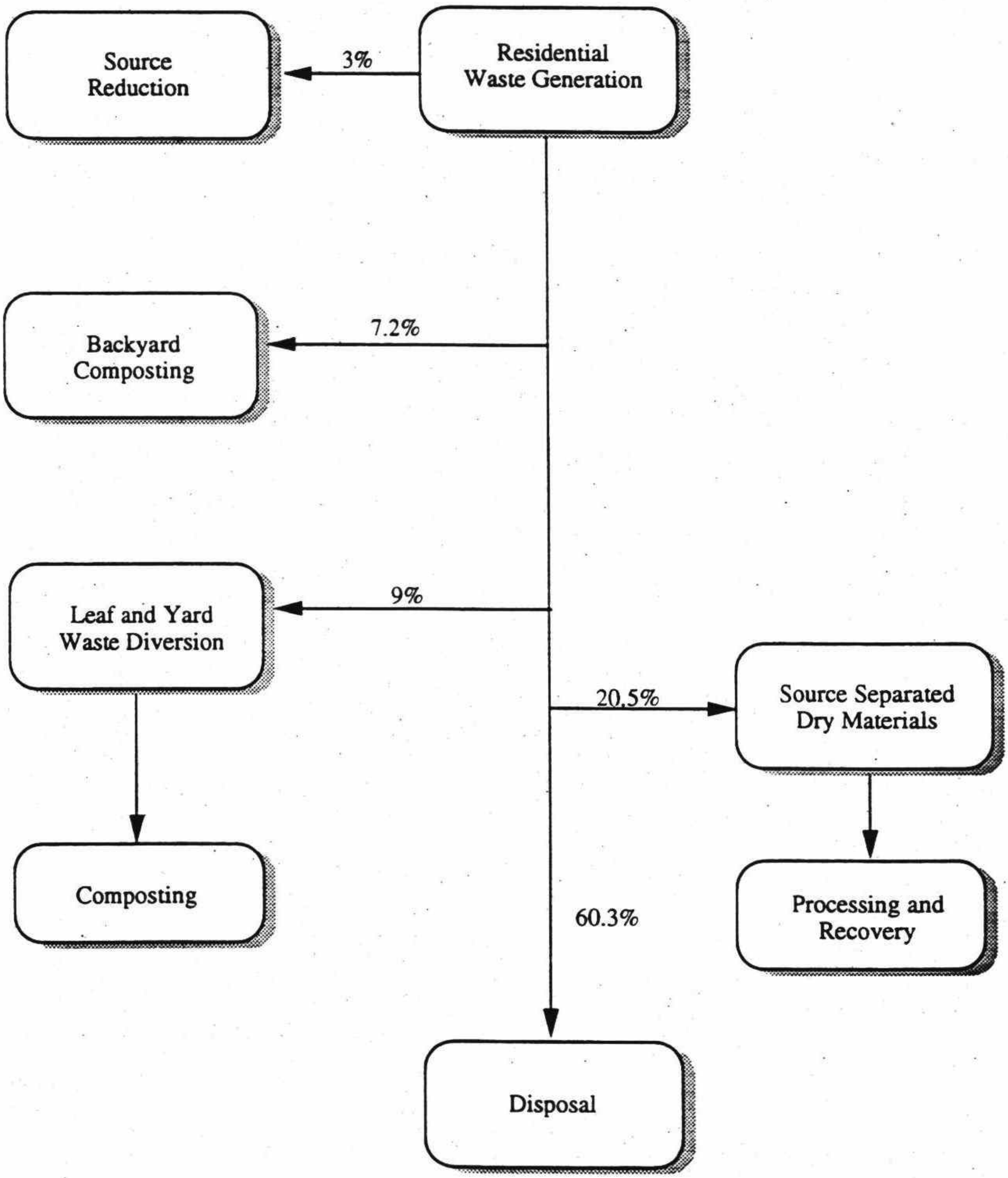
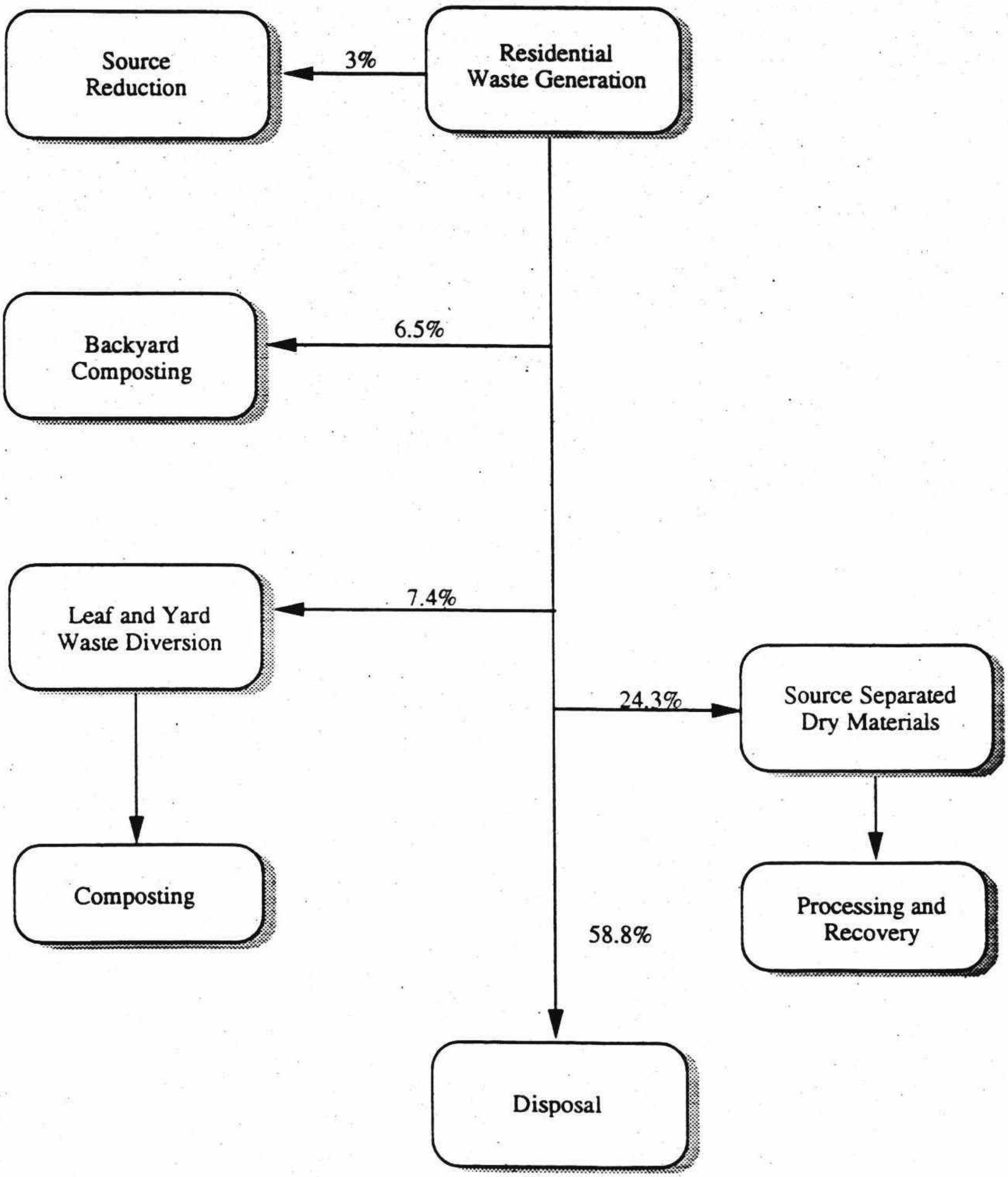


Figure 9.4
Region of Peel
Estimated Waste Flow
Residential System 4 — Expanded Blue Box



9.5 System 5 - Wet/Dry

The City of Mississauga has been the host community for an extensive demonstration project on Wet/Dry collection of household waste for some time. Some of the study documentation was made available to the study team following a meeting with City of Mississauga staff on March 7, 1994. Discussions with staff indicate that City of Mississauga is in favour of a three stream collection approach starting with leaf and yard waste, and adding food waste to the wet stream at a later date (MacDonald, 1994). The timing for implementation of the three stream system is uncertain at this time, as the new recycling collection contract has not been awarded. Dates of 1998 or 2002 have been discussed as possibilities.

A three stream Wet/Dry system would serve all single-family homes in the Region (224,220 households by the year 2000). Some multi-family units would also be served with wet/dry collection, depending on space availability in the buildings and on building owners' willingness to participate in the program. Multi-family units would be assumed to divert wet and dry materials at 50% the rate of single family households. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household year of wet wastes.

Backyard composters would be distributed to a total of 179,380 single-family households by the year 2000. It is assumed that 80% of these composters would be used effectively to divert 169 kg/composter/year.

A central in-vessel composting facility with a design capacity of 118,000 tonnes/year would be required to process collected household wet waste. It has been assumed that one new MRF, with capacity to process 111,200 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Wet/Dry System.

Diversion by the Wet/Dry System is estimated at 51% to 53% by the year 2000. Waste flow for the Wet/Dry System is shown schematically in Figure 9.5.

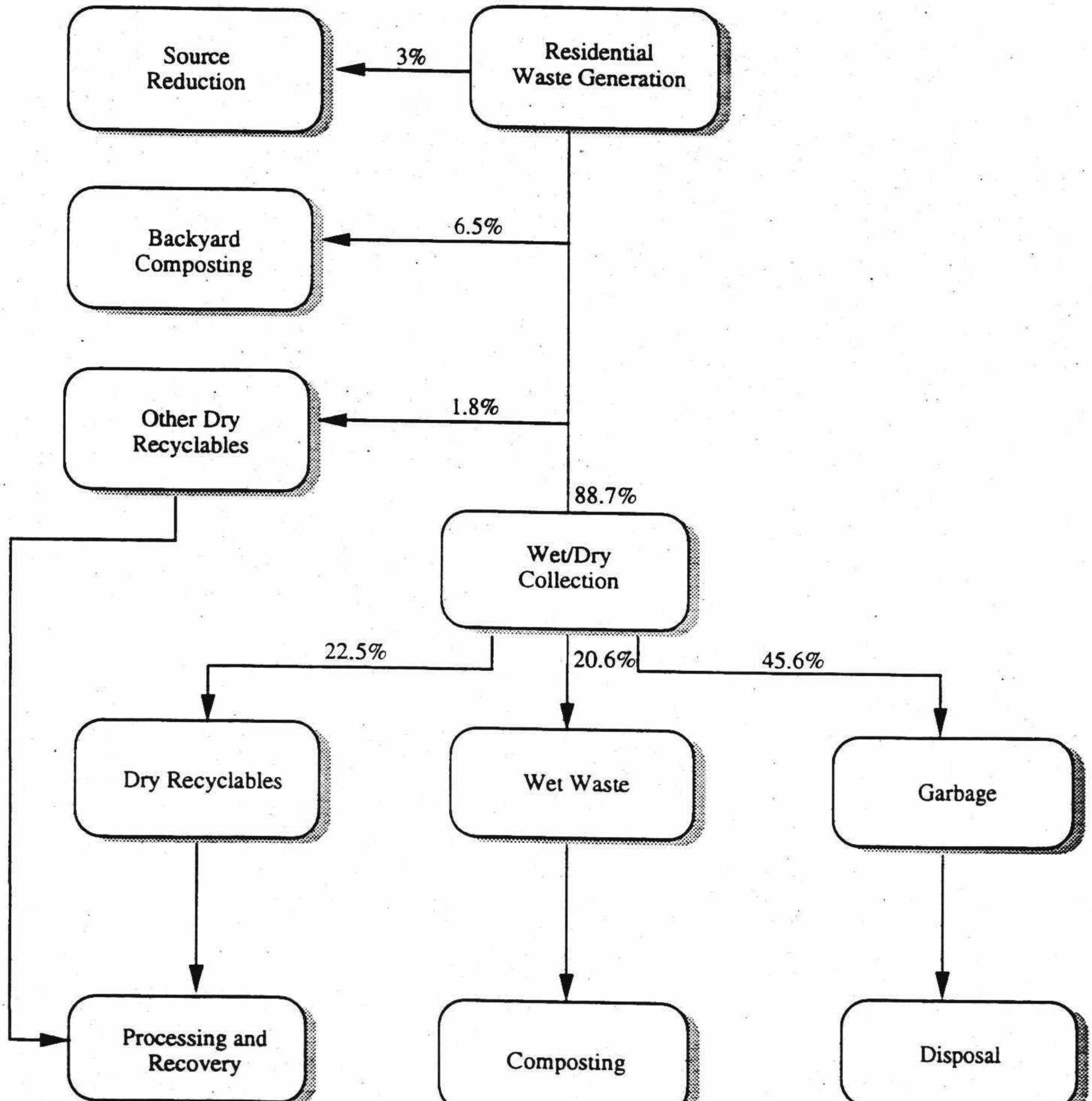
9.6 System 6 - Mixed Waste Processing

The Mixed Waste Processing and composting system builds on the Existing/Committed system, and processes the "third bag" of garbage (which remains after Blue Box recycling, leaf and yard waste collection and backyard composting). Some additional dry recyclables are removed and processed at the front end of the mixed waste processing and composting plant and the remaining mixed waste stream is composted. Finished compost which meets MOEE guidelines would be marketed, but in a worst case scenario (where compost quality does not meet MOEE guidelines), it may require disposal in landfill. In either scenario, considerable mass reduction occurs in the composting process and would result in a reduction of the tonnage leaving the mixed waste composting plant.

Backyard composters would be distributed to a total of 179,380 single-family households by the year 2000. It is assumed that 70% of these composters would be used effectively to divert 169 kg/composter/year. In addition, it is assumed that up to 50% of multi-family households may participate in some community or on-site composting activities, and divert up to 54 kg/household year of wet wastes.

Multi-family households would be assumed to divert dry materials at 50% the rate of single family households. It has been assumed that one new MRF, with capacity to process 60,500 tonnes/year of dry materials on a 2 shift/day, 250 day/year basis, would be constructed to meet the 20-year needs of the Mixed Waste Processing System.

Figure 9.5
Region of Peel
Estimated Waste Flow
Residential System 5 — Wet/Dry



A mixed waste processing and composting plant with design capacity of 360,000 tonnes/year would be required to process the mixed waste stream. The mixed waste processing and composting plant can divert both wet and dry materials generated by multi-family households. These streams are not easily recovered in the other systems considered. In Peel Region, where multi-family units make up a reasonably high portion of households (27.5%-including low rise), this is an important factor in increasing diversion.

Diversion, by the year 2000, by the Mixed Waste Processing and composting system is estimated at:

> 55% to 58% if compost quality does not meet MOEE standards, and
> 74% to 77% if compost quality meets MOEE standards.

Waste flow for the Mixed Waste Processing System is shown schematically in Figure 9.6.

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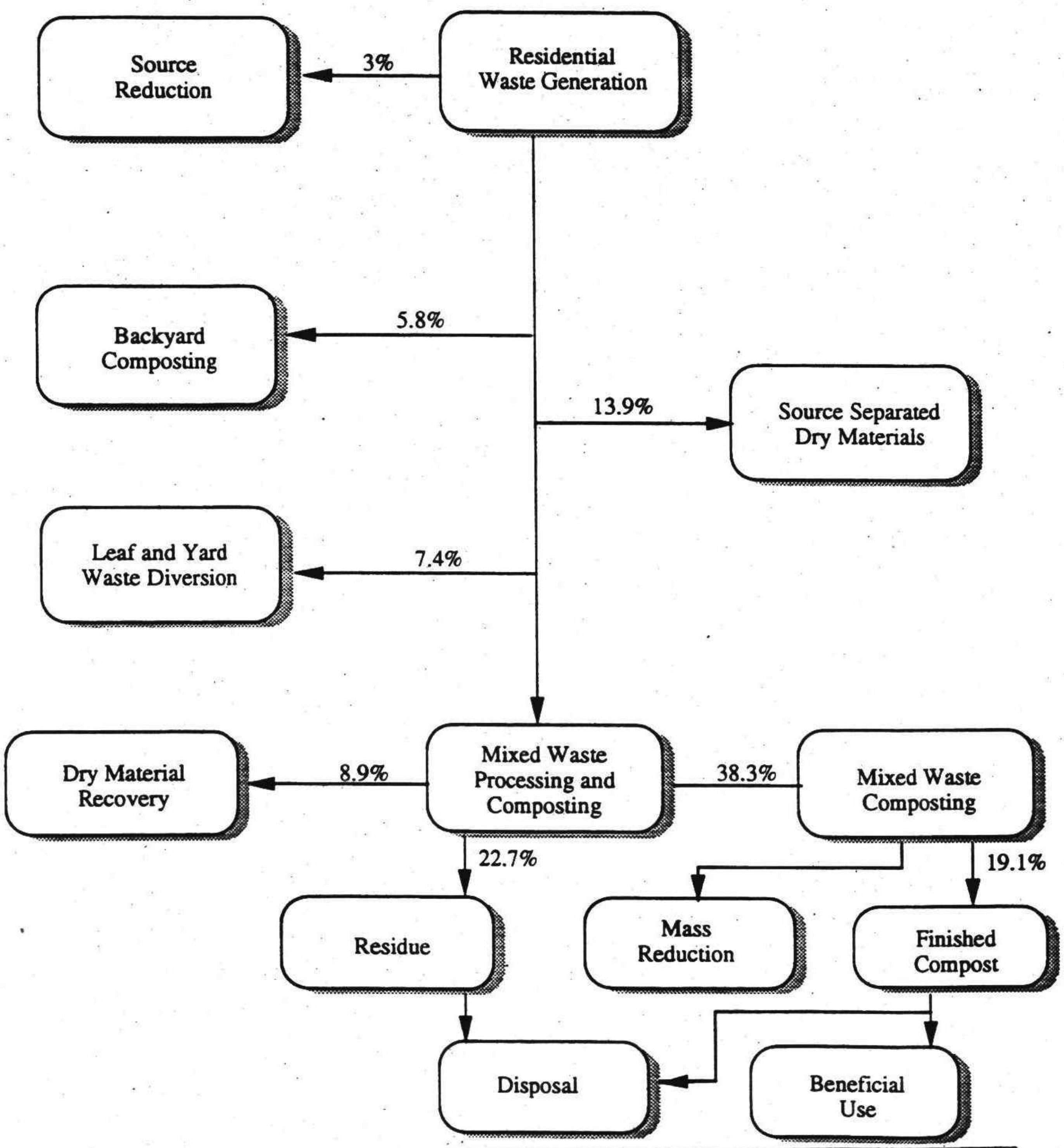
Figure 9.6
Region of Peel
Estimated Waste Flow
Residential System 6 — Mixed Waste Processing



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10.0 REGION OF HALTON RESIDENTIAL SYSTEM WASTE DIVERSION ESTIMATES

This chapter discusses the two residential waste diversion systems for the Region of Halton. Table 10.1 presents the components of the two systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the estudy period (to accomodate projected population increases).

Table 10.2 presents the estimated tonnages of material diverted by each system (using 1992 data).

Table 10.2
Estimated Residential Waste Diversion in Region of Halton in Year 2000

System	Estimated Diversion by Year 2000	
	No Source Reduction	Source Reduction
1–Existing	34%	37%
2–Existing/Committed	39%	42%

Two diversion values are presented for each system. The lower value is achievable by the year 2000 if no source reduction occurs. The higher value is achievable by the year 2000 if a 3% level of source reduction is achieved. Other residential systems were not evaluated for Halton as it has its own landfill, and is not part of the detailed 3Rs assessment.

The diversion achieved by each system is summarized in Table 10.3.

The Region of Halton is expected to have predominantly single-family housing in the future. By the year 2000, housing in the Region is expected to consist of the following housing mix (HSA, 1994):

single-family detached households	95,314	(66% of total);
semi & low rise households	29,073	(20% of total);
high rise households	20,759	(14% of total);
Total Households (year 2000):	145,146.	

10.1 System 1 – Existing

Information on residential waste diversion activities in the Region of Halton was obtained from the following sources:

- survey of regional and municipal staff in February-March, 1993 by the Study Team;
- on-going telephone communication with regional and municipal staff, and waste management contractors, February-October 1993.

Table 10.1
Halton Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Garbage Collection and Disposal • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads	**Garbage Collection and Disposal** • Curbside collection of residential garbage from single family dwellings by municipal forces or contractors to municipalities • Collection of residential garbage from multi-family units by municipal forces or private contractors. • Collection ban on grass clippings (Oakville) • Landfill bans on some items (e.g. recyclable materials, tires, white goods, etc.) with disposal surcharges and rejection of some loads				
Residential Recycling and Collection • Recycling is mandatory in Halton. All households in the Region are served by curbside program, including rural homes and multi-family buildings. Region claims 100% participation, either through curbside pickup or depot service. • Materials include ONP, OCC, telephone directories, PET, HDPE, glass, steel, aluminum, aluminum foil, polystyrene foam, boxboard and fine paper.	**Residential Recycling and Collection** • Recycling is mandatory in Halton. All households in the Region are served by curbside program, including rural homes and multi-family buildings. Region claims 100% participation, either through curbside pickup or depot service. • Materials include ONP, OCC, telephone directories, PET, HDPE, glass, steel, aluminum, aluminum foil, polystyrene foam, boxboard and fine paper. • Addition of 24 new igloos to Igloo Program in 1993 • Purchase of new recycling vehicles - $255,000 allocated • Recycling services to all multi-family buildings with 6 or more units (3Rs regulations)				
Residential Recycling Depots and Transfer Stations • Drop-off depot for dry recyclables at new landfill	**Residential Recycling Depots and Transfer Stations** • Drop-off depot for dry recyclables at new landfill • New HHW depot to be located at new Regional landfill site.				

Table 10.1
Halton Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Leaf and Yard Waste Collection • Seasonal curbside collection of leaf and yard waste • Leaf and yard waste collected at Region's transfer stations delivered to Scott's Farms in Milton	**Residential Leaf and Yard Waste Collection** • Seasonal curbside collection of leaf and yard waste • Leaf and yard waste collected at Region's transfer stations delivered to Scott's Farms in Milton • Oakville has banned the collection of grass clippings • Burlington has proposed a ban on the collection of grass clippings similar to Oakville's				
Residential Household Composting • Backyard composter distribution programs (25,700 units by end of '92). • Limited community composting • Limited vermicomposting	**Residential Household Composting** • Backyard composter distribution programs (25,700 units by end of '92). • Distribution of 5,000 additional backyard composters - being handled by individual municipalities. • Additional community composting • Additional vermicomposting				
Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.). • Special curbside collections of Christmas trees • Both curbside and drop-off services for white goods. • Two permanent HHW depots • Milton collects pumpkins following Halloween and delivers them to a local pig farmer for animal feed	**Other Residential Waste Diversion (HHW, Toxic Taxi, White Goods Collection, White Goods Drop-Off etc.).** • Special curbside collections of Christmas trees • Both curbside and drop-off services for white goods. • Two permanent HHW depots • Milton collects pumpkins following Halloween and delivers them to a local pig farmer for animal feed.				

Table 10.1
Halton Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Composting Facilities • Scott's Farms in Milton • 1.6 ha windrow facility in Oakville for leaf and yard waste • Other municipalities deliver leaf and yard waste to local farmers and landscaping companies	**Composting Facilities** • Scott's Farms in Milton • 1.6 ha windrow facility in Oakville for leaf and yard waste • Other municipalities deliver leaf and yard waste to local farmers and landscaping companies • One new central composting facility (may be shared with Peel).				
Reuse Centres and Activities • Wastewise in Halton Hills operates as community-based resource centre and diversion facility. Includes four different components: 1. education centre and information service 2. reuse centre accepting and selling household goods 3. repair centre repairing household appliances, power tools and equipment. 4. recycling depot for materials not accepted by Blue Box, including: six grades of plastic, eight grades of paper, scrap metal, textiles, aggregate, egg cartons, rubber, film canisters, coat hangers etc.	**Reuse Centres and Activities** • Wastewise in Halton Hills operates as community-based resource centre and diversion facility. Includes four different components: 1. education centre and information service. 2. reuse centre accepting and selling household goods 3. repair centre repairing household appliances, power tools and equipment. 4. recycling depot for materials not accepted by Blue Box, including: six grades of plastic, eight grades of paper, scrap metal, textiles, aggregate, egg cartons, rubber, film canisters, coat hangers etc.				
MRFs • Regional MRF, owned by Region and operated by Halton Recycled Resources Inc. under contract to the Region, processes Region's recyclables	**MRFs** • Region now using private MRF owned by Halton Recycled Resources and operated under contract to the Region.				

Table 10.1
Halton Region
Residential System Components

System 1: Existing	System 2: Existing/Committed	System 3: Direct Cost	System 4: Expanded Blue Box	System 5: Wet/Dry	System 6: Mixed Waste Processing
Residential Promotion and Education • Extensive promotion of backyard composting conducted on a municipal level. Promotion efforts include advertising, open houses and seminar hosted by RCO. Halton Hills currently conducting survey to determine community's interest in backyard composting	**Residential Promotion and Education** • Extensive promotion of backyard composting conducted on a municipal level. Promotion efforts include advertising, open houses and seminar hosted by RCO. Halton Hills currently conducting survey to determine community's interest in backyard composting. • $107,400 has been allocated in the 1993 budget for additional waste reduction education programs and display material design to increase participation rates • Wastewise producing a guide on how to start a community resource centre				

Table 10.3
Region of Halton
Residential System Diversion Estimates
1992

Component	Existing System Diversion (tonnes)	Existing/ Committed System Diversion (tonnes)
Total Residential Waste (tonnes)	46,393	52,288
Paper		
Newspaper	15,923	15,923
Corrugated cardboard (OCC)	2,177	2,177
Mixed paper		4,515
Subtotal (Paper)	18,100	22,615
Glass	4,944	4,959
Tinplate Steel (ferrous)		
Aluminum (non-ferrous)		
Plastic		
PET		
HDPE		
Other Plastic		
Subtotal (Tin, Alum,Plastic)	3,650	4,170
Organics		
Food wastes	2,953	3,528
Yard waste	16,390	16,660
Subtotal (Organics)	19,343	20,188
Wood Waste		0
Construction/Demolition Waste	356	356
Disposable Diapers		0
Textiles/Leather/Rubber		0
Other		0
Subtotal (Wood - Other)	356	356
TOTAL	**46,393**	**52,288**
Diversion Estimate =	**34%**	**39%**

In 1992, an estimated 135,193 tonnes of residential waste were generated in Halton. Of this, 46,393 tonnes were diverted and 88,800 tonnes were disposed.

Residential recycling services in place as at December 31, 1992 consisted of the following activities:

- residential curbside recycling services to 116,320 households;
- four drop-off depots throughout the Region;
- regional MRF to process recycables;
- 25,700 backyard composters;
- leaf and yard waste composting at several different privately owned facilities throughout the Region and municipal site in Oakville;
- WASTEWISE goods exchange and recycling depot;
- curbside and drop-off services for white goods;
- extensive promotion and education program,

Residential waste diversion was made up of activities that contributed to the following estimated diversion totals:

Blue Box curbside	23,450 tonnes
Dry Recyclables from depots	3,600 tonnes
Leaf and yard waste	15,000 tonnes
Household wet waste through backyard composters	4,343 tonnes
Total diverted 1992:	46,393 tonnes.

This information is summarized in Table 10.4. A schematic of waste flows for this system (projected to the year 2000) is presented in Figure 10.1. A more detailed description of diversion activities is presented in the text below. References for the information presented are contained in Section 10.3.

Residential Recycling and Collection

The participation rate for the Blue Box program has been reported at 100%, due to the mandatory recycling requirement in the Region. There are four drop-off container stations in the Region which accept ONP, OCC, glass, scrap metal, drywall and green wastes. Dry materials recovered by curbside and depot programs included:

- 15,923 tonnes of ONP and OMG (commingled);
- 2,177 tonnes of OCC;
- 3,650 tonnes of Aluminum, Steel and Plastic (commingled);
- 4,944 tonnes of Glass;

In addition, 2,268 tonnes of green waste were collected at depots.

Residential Household Composting

Composters were distributed by each of the individual municipalities in the Region of Halton. An estimated 25,700 backyard composters had been distributed by the end of 1992, with a coverage rate of 29% of single-family households.

To maintain the same coverage rate in the year 2000, an additional 7,730 backyard composters (for a total of 33,430 units) would be needed.

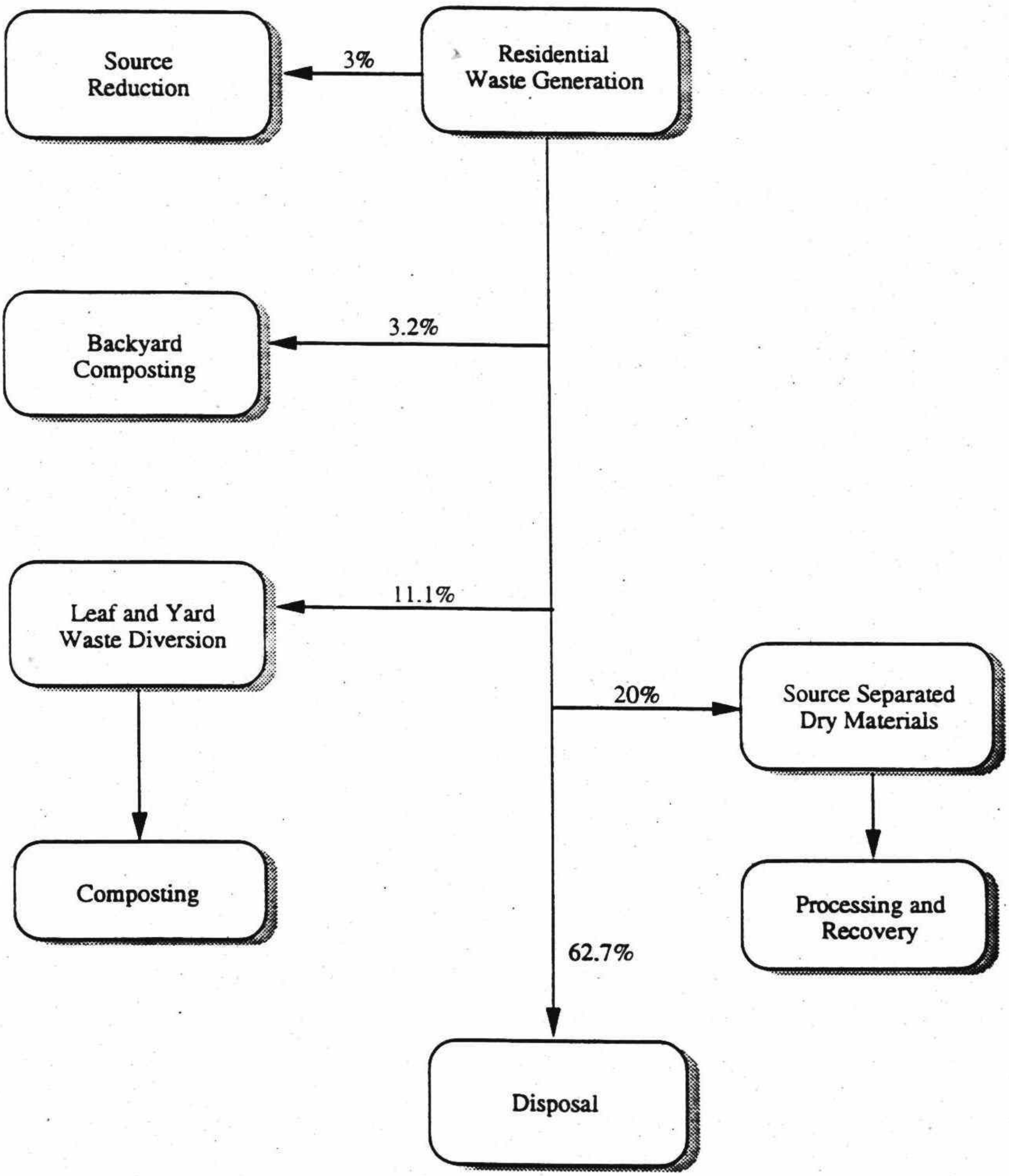
Table 10.4
Region of Halton
Summary of Existing Residential Waste Diversion System Performance
1992

Regional Characteristics	
Regional Population	322,467
Total Number of Households	111,586
— single-family detached	73,258
— high rise	16,374
— semi and low rise	21,954
Households served by curbside	116,320
Number of backyard composters distributed	25,700
Residential Material Diverted in 1992	
Blue Box	23,450 tonnes
Depots (Blue Box materials)	3,600 tonnes
Leaf and yard waste collection and composting	15,000 tonnes
Diversion through backyard composters	4,343 tonnes
Total residential waste diverted	46,393 tonnes
Residential waste diversion summary	
Residential waste generated	135,193 tonnes
Residential waste diverted	46,393 tonnes
Residential waste disposed	88,800 tonnes
Residential waste diversion rate	34.3%

Sources: Social Environment Technical Appendix, May, 1994.
Regional and Municipal Staff, 1993.

Figure 10.1

Region of Halton
Residential System 1 — Existing



Residential Leaf and Yard Waste Collection/Composting Facilities

In 1992, collection of leaf and yard waste in Halton totaled 15,000 tonnes, through a combination of curbside collection and drop-off services.

Leaf and yard waste collected at the Regions' transfer stations were delivered to Scott's Farms in Milton, as were leaf and yard wastes collected in Halton Hills. Oakville operates its own composting site for leaf and yard waste, and Burlington and Milton send their collected leaf and yard wastes to local farmers and landscape companies. Burlington provides a seasonal drop-off service for brush and Christmas trees, which the city chips and offers back to the public or uses in parks. Milton also collected pumpkins following Halloween and delivered them to a hog farmer for animal feed.

Other Residential Waste Diversion

Reuse Activities: The Region operates a community-based resource centre and diversion facility called WASTEWISE, which serves many purposes. It is an education/information service; a reuse centre (accepting office furniture, household goods, etc.); a repair area for broken household appliances and equipment and a recycling depot for materials that are not accepted by the Blue Box program. This includes six grades of plastics, eight grades of paper, scrap metal, textiles, aggregate, egg cartons, rubber, film canisters etc.

Household Hazardous Waste (HHW) Program: Halton residents have access to two permanent household hazardous waste drop-offs staffed by the Region. One is located in Burlington (open one day/week, operated by Laidlaw Environmental Services), and the other in Milton (open three days/week). In 1992, the following quantities of waste were diverted:

- 192,200 litres of HHW;
- 2,977 vehicle batteries;
- 1,285 propane tanks;
- 45 fire extinguishers.

White Goods: Halton residents had access to curbside and drop-off services for white goods which are delivered to scrap dealers for shredding and recycling. In 1992, collection totaled 370 tonnes.

Residential Promotion and Education

The Region and the area municipalities are jointly responsible for 3Rs education and promotion, except for the HHW program, which is promoted by the Region. Municipalities conducted advertising, seminars and open houses to promote backyard composting. WASTEWISE also provided education and information, and is producing a guide on starting a community resource centre.

Material Recycling Facilities (MRFs)

The Region was served by one public MRF (located in Oakville) in 1992. It was owned by the Region, and operated under contract by Halton Recycled Resources Inc. The facility had a design capacity of 30,000 tonnes and processed approximately 25,000 tonnes in 1992. The MRF was operated 24 hours/day, 5 days/week by 36 staff. In general, between 3% and 5% of material was left as non-recyclable residue for disposal. (The regional MRF was closed in 1993, and processing of dry material occurred in a MRF operated by Halton Recycled Resources Inc.)

Diversion Achieved

The estimated residential waste diversion rate for the Existing System was 34.3% in 1992.

10.2 System 2 – Existing/Committed

In general, the Existing/Committed System includes:

- all facilities committed in the Region's most recent five year capital funding budgets (1993 to 1997, or 1994 to 1998 if available);
- impacts of provincial 3Rs regulations (described in Chapter 5.0); and
- any other policy commitments at the regional, provincial or federal level, which had been announced by the end of 1992.

The following measures are outlined in Halton Region's 1992 Development Charges Study and the 1993 Capital and Operating Budgets and five year forecast for Waste Diversion:

- $500,000 has been allocated in the 1993 capital budget for the design and construction of a new Household Hazardous Waste Depot on location at the new Regional landfill site;
- $25,000,000 has been allocated for the design and construction of a Regional Composting facility. However, it is important to note that no provision has been made for the facility in the 1993 Capital Budget and five year forecast;
- $255,000 for the purchase of recycling vehicles from 1993 to 1997. However, the Operating Budget indicated that the vehicles would be sold for approximately $255,000 in conjunction with the new tender contract for the collection of recyclables;
- $207,000 has been allocated in the operating budget as a result of a change in the service level of the Household Hazardous Waste Depot in Burlington. The Facility will operate each Saturday of the month as opposed to once per month in prior years;
- $87,700 has been allocated in the operating budget as a result of the "Shared Responsibility Demonstration Project" whereby the Region is responsible for the collection of recyclables, while the Province (in conjunction with the Commercial/Industrial sector) is responsible for provision of the materials recycling facility. The province has provided a grant for processing costs. With the termination of operations at the Oakville MRF, a $145,000 reduction in the 1993 operating budget was anticipated;
- $34,300 was allocated (1993) to purchase 17 new Igloos (12 as replacement and 5 for new sites);
- $107,400 has been estimated in the 1993 operating budget for Waste Reduction Education Programs and display materials designed to increase participation rates;

The Region expanded the range of materials collected in the Blue Box program to include the following additional materials:

- polystyrene;
- aluminum foil;
- HDPE;
- boxboard;
- fine paper;
- mixed paper.

The Town of Oakville implemented a ban on collection of grass clippings. An additional 5,000 new composters were distributed to Regional residents.

Impacts of the 3Rs Regulations

Single Family Households
The Region of Halton consists of four municipalities. Two have populations of greater than 50,000 (Burlington, Oakville), while the other two (Halton Hills and Milton) have populations between 5,000 and 50,000.

Municipalities in Halton would be included in the 3Rs regulations, and would therefore be required to:

- provide recycling services to parallel garbage collection service (curbside or depot);
- collect a list of "basic Blue Box" materials as well as two others; and
- provide backyard composting programs.

The designated dry materials (ONP, OMG, aluminum, glass, steel and plastic food containers) are collected, along with several supplementary materials (PS, aluminum foil, HDPE, boxboard and fine paper), therefore no additional diversion of dry materials is likely.

Under the regulations, all municipalities of greater than 50,000 (Burlington, Oakville) are required to provide leaf and yard waste collection programs. These municipalities currently meet this requirement with collected leaf and yard waste. Leaf and yard waste from Oakville is composted at the Regional compost site, and leaf and yard waste from Burlington is used by local farmers and landscape companies. Under the regulations, other municipalities between 5,000 and 50,000 that have leaf and yard waste collection programs are required to compost the material collected. This is not likely to be a major factor for municipalities in the Region of Halton.

Since the required levels of service are well established in most municipalities, the diversion impact of additional services that would result from implementing the 3Rs Regulations in Halton is expected to be minor.

Impacts of 3Rs Regulations on Recycling by Households in Multi-Family Buildings
The 3Rs Regulations require that owners of buildings containing six or more units in communities of greater than 5,000 provide source separation programs for collection by the municipalities. Some opportunities are currently available in the Region of Halton for recycling by multi-family households. Implementation of the 3Rs Regulations is likely to increase recycling opportunities for multi-family households. The resulting diversion has been estimated assuming that 100% of multi-family households are provided with recycling opportunities (although the exact number of households in buildings containing 6 or more units is not known).

Impacts of Other Policy Commitments

The impacts of NAPP are incorporated into the diversion rates through source reduction estimates. The potential impacts of CIPSI have not been considered in the estimates.

Diversion Achieved

Diversion by the Existing/Committed system will not be significantly greater than that of the Existing System, and is estimated at 39% to 42% by the year 2000. Waste flow for the Existing/Committed System is presented schematically in Figure 10.2.

10.3 References

Future Urban Research. *GTA 3Rs Analysis Municipal Finance Technical Appendix*, 1994.

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Antonio, P. 1993. Personal communications with P. Antonio, Milton. October, 1993.

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Pantonio, P. 1993. Personal communications with P. Pantonio, Milton. March 1993.

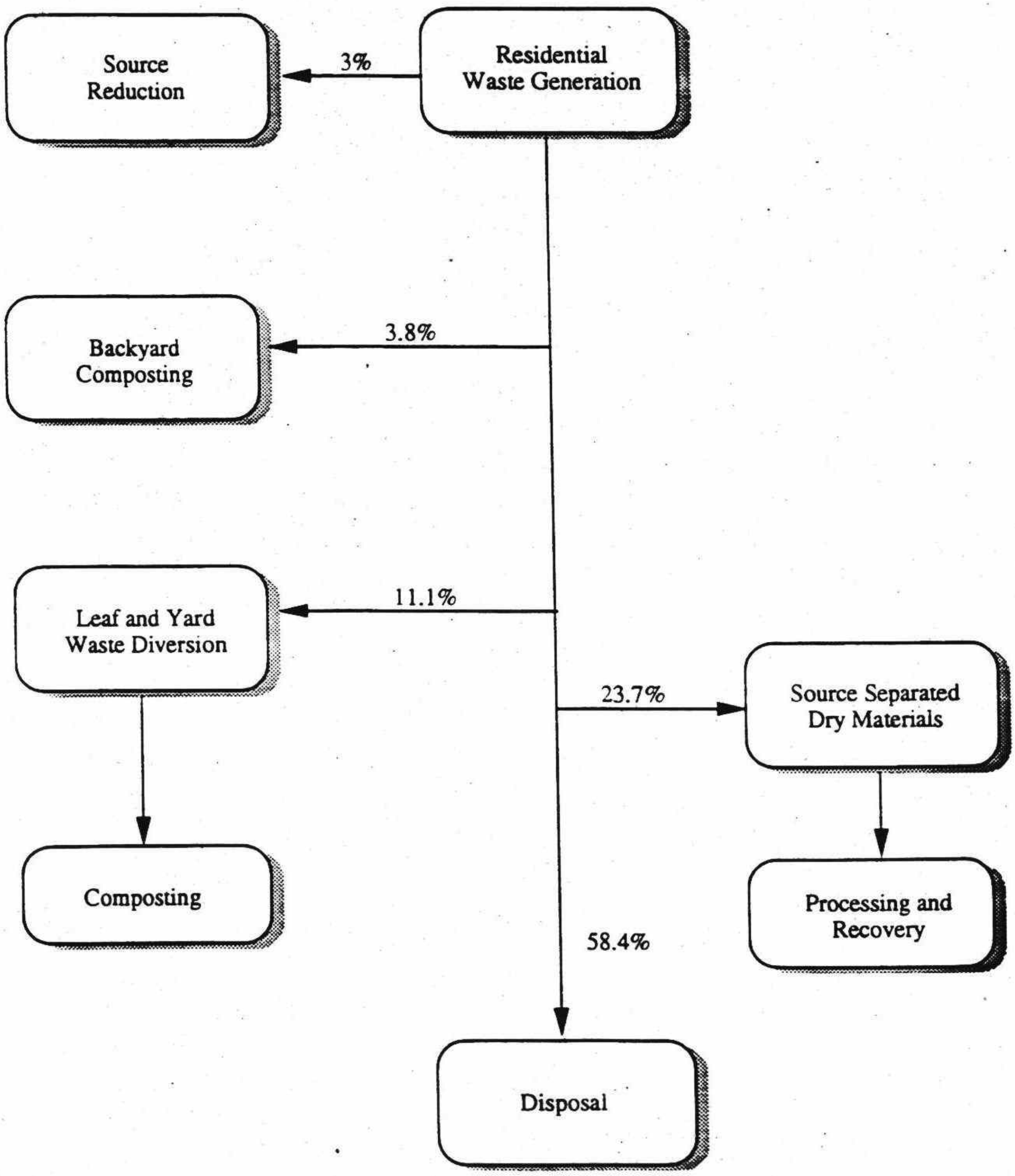
Sargeant, P. 1993. Personal communications with P. Sargeant, Halton Hills. October, 1993.

Torrance, P. 1993. Personal communications with P. Torrance, Halton. February, 1993.

Van de Valk, D. 1993. Personal communications with D. Van de Valk, Waste Wise, Halton, February 1993.

Figure 10.2

**Region of Halton
Residential System 2 — Existing/Committed**



11.0 IC&I WASTE PROJECTIONS AND COMPOSITION

11.1 Introduction

This chapter presents the basis for estimates of historical and future IC&I waste generation in the GTA Regions. Estimated IC&I waste composition is also presented, and the method by which the IC&I waste composition estimates were developed is described.

Residential and IC&I waste projections and composition estimates were estimated separately for each GTA Region for this study. Residential waste generation and composition estimates were addressed in Chapter 4.

11.2 IC&I Waste Projections

11.2.1 Data and Methodology Used

In this study the term "IC&I waste generation" refers to the rate of IC&I waste disposal in 1987. This is the year from which provincial waste diversion objectives (which are stated as a reduction in the waste disposal rate per capita recorded for 1987) will be measured in the future. IC&I waste which had historically been recycled prior to that time and had not traditionally been disposed in municipal landfills, is not of interest to the study and is not included in these estimates. Where IC&I waste disposal is discussed, it refers to the recorded disposal rate in GTA for any given year.

IC&I waste projections for the GTA were developed by examining IC&I waste disposal patterns in each GTA Region for the period 1986 to 1992. Historical waste generation rates (expressed as tonnes/employee/year) were applied to future employment projections for each GTA Region to estimate future IC&I waste generation by Region. These estimates were added together to estimate IC&I waste projections for the GTA for the period 1993 to 2015.

Where possible, IC&I waste projections were based on IC&I waste disposal rates recorded for 1987. Where 1987 data were unusually high, an appropriate or typical rate was chosen, based on the available data.

Historical IC&I waste disposal data for each region for the years 1986 to 1992 are presented in Table 11.1. Table 11.2 presents estimated employment levels and estimated per-employee disposal rates for those years (Hemson Consultants Ltd., 1989; and Clayton Research Associates, 1991, Hardy Stevenson and Associates, 1994). Table 11.3 presents employment projections for 1993 to 2015, which are based on data accepted for planning purposes by the GTA and Regions (Hardy Stevenson and Associates, 1994). For all Regions except Durham, these are based on data prepared for the Office of the Greater Toronto Area (OGTA) (Hemson Consulting Ltd., and the Coopers Lybrand Group, 1993). For Durham Region, data adopted by the Region have been used.

The methods by which the historical data and the future employment projections were used to estimate future IC&I waste generation are discussed in the following sections.

11.2.2 IC&I Waste Generation Estimates for Region of Durham

It was assumed for analysis that most IC&I waste from Region of Durham was disposed in the Brock West landfill. Data were obtained from Metro Toronto staff on the quantities of total waste disposed by Durham sources (residential and IC&I) in Metro landfills for the years 1986 to 1992 (Scanga, Metro Works Department, 1993). There was a discrepancy between the residential quantities reported by Metro and Durham (Collis, Region of Durham, 1993). For this analysis, the Study Team used the residential quantities reported by Durham (which were

Table 11.1
Summary of Available Data on IC&I Waste Disposal by Region in GTA Landfills 1986-1992

Year	Durham IC&I Waste Disposal (tonnes)	Halton IC&I Waste Disposal (tonnes)	Peel IC&I Waste Disposal (tonnes)	Metro IC&I Waste Disposal (tonnes)	York IC&I Waste Disposal (tonnes)	Total GTA IC&I Waste Disposal (tonnes)
1986	152,125			1,445,857	221,650	1,819,632
1987	161,826	109,100	449,360	1,490,098	339,487	2,549,872
1988	190,509	111,100	478,926	1,405,066	336,712	2,522,313
1989	189,353	93,300	470,449	1,241,573	377,296	2,371,971
1990	190,264	101,000	361,513	1,169,697	303,689	2,126,163
1991	118,694	70,000	224,086	704,492	161,643	1,278,915
1992	62,615	13,800	44,203	200,015	26,434	347,066

Notes:

1) IC&I waste quantities to landfill were calculated by difference between total waste to landfill and residential waste to landfill
2) 1986 Durham value equals total waste landfilled (from SWEAP 4.1 report,1988) less residential waste to landfill(estimated from 1987 generation rate)
3) 1987 Durham value equals total waste landfilled (from MacLaren Waste Study,1988) less residential waste to landfill
4) Total waste to landfill for Durham taken from Metro landfill records for 1988-1992; tonnages for Brock & Scott landfills added to total waste landfilled.
5) Residential waste to landfill taken from Region of Durham landfill records.
6) Metro landfill data taken from Metro Toronto landfill records
7) 1991 Metro IC&I quantity excludes waste export. Metro estimates that 400,000 tonnes were exported, which is assumed to be primarily IC&I
8) 1992 Metro IC&I quantity excludes waste export. Metro estimates that 1,000,000 tonnes were exported, which is assumed to be primarily IC&I
9) 1991 Peel IC&I quantity excludes waste export. Peel estimates that 53,125 tonnes were exported, which is assumed to be primarily IC&I
10) 1992 Peel IC&I quantity excludes waste export. Peel estimates that 253,183 tonnes were exported, which is assumed to be primarily IC&I
11) 1988 residential landfill quantity for Region of York from Table 2-1, Waste Management Study, 1989, MacLaren
12) 1988 residential landfill percentage for Region of York applied to 1986 and 1987 to calculate quantity going to landfill (31.8%)
13) 25,000 tonnes added to total waste landfilled for the Township of King and Georgina Landfills for 1986-1991; 15,000 tonnes added for 1992. (personal communication with Mr. J. Flewelling - Region of York)
14) Halton landfill data (1990 - 1992) supplied by Region of Halton; Data provided by MOEE in July 1993 indicate that IC&I waste landfilled in 1987, 1988 and 1989 totalled 109,100, 111,100 and 93,300 tonnes respectively.

Table 11.2

Estimated Number of Employees
and Estimated IC&I Disposal Rates
in GTA Regions
1986-1992

Year	Estimated Number of Employees					Estimated IC&I Disposal Rate (tonnes/employee/year)				
	Durham	Halton	Peel	Metro	York	Durham	Halton	Peel	Metro	York
1986	137,264	119,000	304,000	1,349,000	170,000	1.11			1.07	1.30
1987	141,537	122,932	317,874	1,353,174	183,631	1.14	0.89	1.41	1.10	1.85
1988	145,943	126,993	332,382	1,357,361	198,356	1.31	0.87	1.44	1.04	1.70
1989	150,485	131,189	347,552	1,361,561	214,261	1.26	0.71	1.35	0.91	1.76
1990	155,170	135,523	363,414	1,365,774	231,441	1.23	0.75	0.99	0.86	1.31
1991	160,000	140,000	380,000	1,370,000	250,000	0.74	0.50	0.73	0.81	0.65
1992	166,025	145,192	390,337	1,379,686	259,571	0.38	0.10	0.76	0.87	0.10

Notes:
1) Employment data: Social Environment Technical Appendix, May, 1994.
2) Estimated IC&I disposal rate for years after 1989 are presented to show dramatic decrease in disposed IC&I waste in each GTA Region from 1990 on, as a result of increased waste export and other factors.

Table 11.3

Employment Estimates (1986 - 1992)
Employment Projections (1993 - 2015)
For GTA Regions

Year	Durham	Metro	York	Peel	Halton	Total
1986	137,264	1,349,000	170,000	304,000	119,000	2,079,264
1987	141,537	1,353,174	183,631	317,874	122,932	2,119,148
1988	145,943	1,357,361	198,356	332,382	126,993	2,161,035
1989	150,485	1,361,561	214,261	347,552	131,189	2,205,048
1990	155,170	1,365,774	231,441	363,414	135,523	2,251,322
1991	160,000	1,370,000	250,000	380,000	140,000	2,300,000
1992	166,025	1,379,686	259,571	390,337	145,192	2,340,811
1993	172,277	1,389,440	269,509	400,956	150,576	2,382,758
1994	178,765	1,399,264	279,827	411,863	156,160	2,425,879
1995	185,497	1,409,157	290,540	423,067	161,951	2,470,212
1996	192,482	1,419,119	301,664	434,576	167,956	2,515,797
1997	199,730	1,429,153	313,213	446,398	174,185	2,562,679
1998	207,252	1,439,257	325,205	458,542	180,644	2,610,900
1999	215,056	1,449,432	337,656	471,016	187,343	2,660,503
2000	223,155	1,459,680	350,583	483,829	194,290	2,711,537
2001	231,558	1,470,000	364,005	496,991	201,495	2,764,049
2002	240,278	1,482,510	377,941	510,510	208,967	2,820,206
2003	249,326	1,495,126	392,411	524,398	216,716	2,877,977
2004	258,716	1,507,850	407,435	538,664	224,752	2,937,417
2005	268,458	1,520,682	423,034	553,317	233,087	2,998,578
2006	278,568	1,533,623	439,230	568,369	241,730	3,061,520
2007	289,058	1,546,674	456,046	583,831	250,694	3,126,303
2008	299,943	1,559,837	473,506	599,713	259,991	3,192,990
2009	311,238	1,573,111	491,634	616,028	269,632	3,261,643
2010	322,959	1,586,498	510,457	632,786	279,631	3,332,331
2011	335,120	1,600,000	530,000	650,000	290,000	3,405,120
2012	347,740	1,609,729	538,811	657,136	295,506	3,448,922
2013	360,835	1,619,518	547,768	664,352	301,115	3,493,588
2014	374,424	1,629,366	556,874	671,646	306,831	3,539,141
2015	388,523	1,639,274	566,132	679,021	312,656	3,585,606

Notes:
Employment data: Social Environment Technical Appendix, May, 1994.

lower than those reported by Metro). These were subtracted from the total waste quantities reported by Metro to estimate the IC&I quantities generated in Durham and disposed at Metro landfills. This method may slightly underestimate residential waste generation in Region of Durham, and overestimate IC&I waste generation; however, the differences are not expected to be significant.

For each year 1986 to 1992, the quantity of IC&I waste disposed was divided by the number of employees in the Region in that year to estimate the IC&I waste disposal rate. The 1987 rate was estimated to be 1.14 tonnes/employee/year (161,826 tonnes disposed divided by 141,537 employees). The 1986 and 1988 rates were estimated to be 1.11 and 1.31 tonnes/employee/year, respectively.

The 1987 IC&I waste disposal rate was used for projections of future IC&I waste generation in the Region of Durham, since it was typical for the period, and represents the year which will form the benchmark for measuring progress towards the Province's 50% diversion goal. The rate is based on disposal information provided by the Region and assumes that the Region's IC&I sectors engaged in minimal off-site waste diversion activities, except those that had traditionally been practiced for a number of years. Employment projections presented in Table 11.3 were multiplied by the rate of 1.14 tonnes/employee/year to estimate IC&I waste generation in the Region of Durham to the year 2015. These projections are shown in Table 11.4, and indicate that approximately 196,000 tonnes of waste would be generated by Region of Durham IC&I sources in 1993, and an estimated 443,000 tonnes would be generated in the year 2015. This suggests that Region of Durham sources would be responsible for generation of 7% of GTA's IC&I waste stream in 1993, and for approximately 10% of GTA's IC&I waste stream in the year 2015.

11.2.3 IC&I Waste Projections for Metro Toronto

Data on IC&I waste disposed at Metro Toronto landfills for the period 1986 to 1992 were supplied to the Study Team by Metro Toronto staff (Scanga, Metro Works Department, 1993). For this analysis it was assumed that there was minimal waste diversion occurring in the IC&I sector in 1986 and 1987, hence the quantity of IC&I waste landfilled approximated the quantity generated.

The quantity of IC&I waste disposed in 1987 (1,490,098 tonnes) was divided by the estimated number of employees in Metro Toronto in 1987 (1,353,174) to yield an estimated IC&I waste generation rate of 1.10 tonnes/employee/year. This was very close to the IC&I waste generation rates estimated for 1986 and 1988 which were 1.07 and 1.04 tonnes/employee/year respectively.

The 1987 IC&I rate was used for projections of future IC&I waste generation in Metro Toronto. Employment projections presented in Table 11.3 were multiplied by the rate of 1.10 tonnes/employee/year to estimate IC&I waste generation to the year 2015. These projections are shown in Table 11.4, and indicate that approximately 1,528,000 tonnes of waste would be generated by Metro Toronto IC&I sources in 1993, and an estimated 1,803,000 tonnes would be generated in the year 2015. This suggests that Metro Toronto sources would be responsible for generation of 54% of GTA's IC&I waste stream in 1993, and for approximately 41% of GTA's IC&I waste stream in the year 2015.

11.2.4 IC&I Waste Generation Estimates for Region of York

Data on IC&I waste disposed by Region of York sources were obtained from Metro Toronto for the Keele Valley landfill (Scanga, Metro Works Department, 1993), and from Region of York staff for the two small landfills in the Region (Flewelling, Region of York, 1993).

Table 11.4

IC&I Waste Generation* Projections for GTA Regions, 1993 to 2015

Year	Durham Region IC&I Waste Generation (tonnes)	Halton Region IC&I Waste Generation (tonnes)	Metro Toronto IC&I Waste Generation (tonnes)	Peel Region IC&I Waste Generation (tonnes)	York Region IC&I Waste Generation (tonnes)	Total GTA IC&I Waste Generation (tonnes)
1993	196,396	134,013	1,528,384	565,348	425,824	2,849,965
1994	203,792	138,982	1,539,190	580,727	442,127	2,904,818
1995	211,467	144,136	1,550,073	596,524	459,053	2,961,253
1996	219,429	149,481	1,561,031	612,752	476,629	3,019,323
1997	227,692	155,025	1,572,068	629,421	494,877	3,079,083
1998	236,267	160,773	1,583,183	646,544	513,824	3,140,591
1999	245,164	166,735	1,594,375	664,133	533,496	3,203,903
2000	254,397	172,918	1,605,648	682,199	553,921	3,269,083
2001	263,976	179,331	1,617,000	700,757	575,128	3,336,192
2002	273,917	185,981	1,630,761	719,819	597,147	3,407,624
2003	284,232	192,877	1,644,639	739,401	620,009	3,481,158
2004	294,936	200,029	1,658,635	759,516	643,747	3,556,864
2005	306,042	207,447	1,672,750	780,177	668,394	3,634,810
2006	317,568	215,140	1,686,985	801,400	693,983	3,715,076
2007	329,526	223,118	1,701,341	823,202	720,553	3,797,740
2008	341,935	231,392	1,715,821	845,595	748,139	3,882,883
2009	354,811	239,972	1,730,422	868,599	776,782	3,970,587
2010	368,173	248,872	1,745,148	892,228	806,522	4,060,943
2011	382,037	258,100	1,760,000	916,500	837,400	4,154,037
2012	396,424	263,000	1,770,702	926,562	851,321	4,208,009
2013	411,352	267,992	1,781,470	936,736	865,473	4,263,024
2014	426,843	273,080	1,792,303	947,021	879,861	4,319,107
2015	442,916	278,264	1,803,201	957,420	894,489	4,376,290

*IC&I waste generation estimates are based on the rate of IC&I waste disposal in 1987. IC&I wastes which had traditionally been diverted from disposal prior to 1987 are not of interest to this study, and are not included in IC&I waste generation estimates

For each year from 1986 to 1992, the quantity of IC&I waste disposed was divided by the number of employees in the Region to estimate the IC&I waste disposal rate. The 1987 rate was estimated to be 1.85 tonnes/employee/year (339,487 tonnes disposed divided by 183,631 employees). The 1986, 1988 and 1989 IC&I rates were estimated to be 1.30, 1.70 and 1.76 tonnes/employee/year respectively. The 1986 value appeared to be low when compared to the four year (1986-1989) average (1.65 tonnes/employee/year). The 1987 rate was high (1.85 tonnes/employee/year), perhaps due to increased construction activity in the Region. There is no construction waste information available for 1987, however, data for 1988 indicate that construction waste made up 21% (MacLaren, 1989) of the total waste landfilled. The average of the 1986 and 1987 IC&I rates was 1.58 tonnes/employee/year, which is approximately equal to the four-year average. Therefore projections of future IC&I waste generation in the Region were based on this value.

Employment projections presented in Table 11.3 were multiplied by the rate of 1.58 tonnes/employee/year to estimate IC&I waste generation to the year 2015. These projections are shown in Table 11.4 and indicate that approximately 426,000 tonnes of waste would be generated by York Region IC&I sources in 1993. An estimated 894,000 tonnes would be generated in the year 2015. This suggests York Region sources would be responsible for generation of 15% of GTA's IC&I waste stream in 1993, and for approximately 20% of GTA's IC&I waste stream in the year 2015.

11.2.5 IC&I Waste Projections for Region of Peel

Data on the quantities of IC&I waste disposed at Region of Peel landfills from 1987 to 1992 were obtained from Region of Peel staff (Morgan-Fraser, L. Region of Peel, 1993).

The quantity of IC&I waste disposed in 1987 (449,360 tonnes) was divided by the estimated number of employees in Region of Peel in 1987 (317,874) to yield an estimated IC&I waste generation rate of 1.41 tonnes/employee/year.

The 1987 IC&I rate was used for projections of future IC&I waste generation in Peel Region. Employment projections presented in Table 11.3 were multiplied by the rate of 1.41 tonnes/employee/year to estimate IC&I waste generation to the year 2015. These projections are shown in Table 11.4 and indicate that approximately 565,000 tonnes of waste would be generated by Peel Region IC&I sources in 1993, and an estimated 957,000 tonnes would be generated in the year 2015. This suggests Peel Region sources would be responsible for generation of 20% of GTA's IC&I waste stream in 1993, and for approximately 22% of GTA's IC&I waste stream in the year 2015.

11.2.6 IC&I Waste Projections for Region of Halton

Data on the quantities of IC&I waste disposed at Region of Halton landfills from 1987 to 1989 was obtained from MOEE staff (MOEE, July 1993) and data from 1990 to 1992 was supplied by Region of Halton staff.

The quantity of IC&I waste disposed in 1987 (109,100 tonnes) was divided by the estimated number of employees in the Region in 1987 (122,932) to yield an estimated IC&I waste disposal rate of 0.89 tonnes/employee/year.

The 1987 IC&I waste disposal rate was used for projections of future IC&I waste generation in Region of Halton. Employment projections presented in Table 11.3 were multiplied by the rate of 0.89 tonnes/employee/year to estimate IC&I waste generation to the year 2015. These projections are shown in Table 11.4 and indicate that approximately 134,000 tonnes of waste would be generated by Region of Halton IC&I sources in 1993, and an estimated 278,000 tonnes would be generated in the year 2015. This suggests that Region of Halton sources

would be responsible for generation of 5% of GTA's IC&I waste stream in 1993, and for approximately 6% of GTA's IC&I waste stream in the year 2015.

11.2.7 IC&I Projections Estimates for the GTA

The above estimates for each GTA region were combined to estimate the quantities of IC&I waste which would be generated in the GTA for the years 1993 to 2015. These estimates are presented in Table 11.4, and show that an estimated 2.85 million tonnes of IC&I waste was generated in the GTA in 1993. This will increase to an estimated 4.38 million tonnes in the year 2015.

11.3 IC&I Waste Allocation To IC&I Generators

11.3.1 Method

An estimate of the composition of IC&I waste generated in the GTA was required in order to estimate the impacts of various waste diversion measures. Because of the way in which the 3Rs Regulations (MOEE, 1994) are written, it was also necessary to estimate the quantity and composition of waste generated by various IC&I sectors.

The waste composition calculations were carried out in two steps:

- waste allocation to different IC&I sectors; and
- IC&I waste composition estimates for different sectors and GTA regions.

IC&I waste allocation to different sectors is described in this section. IC&I waste composition estimates are discussed in Section 11.4.

Detailed employment data for each GTA Region were purchased from Dun and Bradstreet (D&B) for this study (Dun and Bradstreet, 1993). The data were supplied by Canadian 4-digit SIC (Standard Industrial Classification) code for each GTA region. These were aggregated into 2-digit SIC codes for preliminary calculations. They were eventually aggregated into the ten major SIC categories, used by Statistics Canada, which are:

- Primary;
- Manufacturing;
- Construction;
- Transport, Communication and Utilities (TCU);
- Wholesale;
- Retail;
- Financial, Insurance and Real Estate (FIRE);
- Commercial Services;
- Non-commercial Services;
- Public Administration.

Total employment for each major IC&I sector (based on the 1991 Statistics Canada census) was the most recent data available from Statistics Canada (Hardy Stevenson and Associates, 1994). The D&B data provided a more detailed breakdown of the distribution of employment within the various IC&I sectors. To ensure consistency between the two sets of numbers, the D&B employment data were scaled-up proportionately to agree with the Regional totals shown in Table 11.3. The scaled D&B employment by major sector (SIC) is presented in Table 11.5.

Several IC&I waste generation and composition studies were reviewed (Gore & Storrie Ltd., 1991, RIS, CH2M Hill, KPMG, 1993, Proctor & Redfern, SENES Consultants Ltd., 1991, R.W. Beck & Associates, 1992, CH2M Hill, 1991, Matrix Management Group, 1988) to

Table 11.5

Allocation of Employment to Ten Major SIC Groups in Each GTA Region, 1992

Major IC&I Group No.	Description	Employment											
		Durham		Halton		Metro Toronto		Peel		York		Total GTA	
		D&B	Pro-Rated Estimate	D&B	Pro-Rated Estimate	D&B	Pro-Rated Estimate	D&B	Pro-Rated Estimate	D&B	Pro-Rated Estimate	D&B	Pro-Rated Estimate
1	Primary	4	4,367	1,471	3,380	2,536	7,047	409	3,981	1,668	5,400	6,088	24,174
2	Manufacturing	626	39,997	32,282	32,402	15,771	206,491	5,137	95,110	53,535	51,760	107,351	425,761
3	Construction	118	9,247	6,037	9,513	6,583	65,792	506	22,520	24,259	24,855	37,503	131,928
4	TCU	1,641	15,994	4,200	6,534	13,105	103,135	995	45,392	9,220	13,714	29,161	184,769
5	Wholesale	1,051	5,301	10,159	8,075	19,443	58,801	7,755	30,693	32,130	20,020	70,538	122,889
6	Retail	35	23,380	10,707	22,211	1,842	161,260	267	48,959	17,713	36,022	30,564	291,832
7	FIRE	803	7,730	40,938	8,850	19,065	160,997	2,092	18,524	11,450	17,529	74,348	213,631
8	Non-Commercial	4,751	24,750	6,867	19,396	74,296	209,407	9,636	39,222	20,991	27,718	116,541	320,494
9	Commercial	1,176	25,504	15,269	27,938	30,889	312,335	7,294	69,662	27,880	54,400	82,508	489,840
10	Public Administration	5,441	9,733	9,509	6,899	44,545	94,428	1,812	16,268	3,675	8,092	64,982	135,420
	Total (All)	15,646	166,004	137,439	145,198	228,075	1,379,693	35,903	390,332	202,521	259,510	619,584	2,340,737

1) D&B refers to 1992 employment data purchased by Hardy Stevenson Associates from Compusearch in 1993. This information was obtained from Dun & Bradstreet.
2) "Pro-Rated Estimate" refers to levels scaled to the reported 1992 employment in each Region for 1992 (Hardy Stevenson Associates, 1994)

determine the relative generation rates for different types of IC&I activity. The unit rates were calibrated for each Region using the estimated quantity of IC&I waste generated in 1992 (excluding construction and demolition waste).

Unit waste generation rates estimated for each major SIC group in each GTA region are presented in Table 11.6. The unit generation rates vary because of the different employment mix and the different activities within the major SIC grouping in each region. In general, the highest per employee waste generation occurs in the manufacturing sector and the lowest in the financial/insurance/real estate sector. The wholesale and retail sectors also have relatively high unit waste generation rates.

Construction and demolition (C&D) waste quantities for each region in GTA in 1992 were calculated using the reported data on C&D quantities as a percentage of total waste landfilled. C&D waste quantities for the regions of Durham, York and Metro Toronto were estimated using the reported data on C&D quantities as a percentage of total waste landfilled (Metro Works Department, 1990). For Peel Region, the quantity of C&D waste disposed was provided by Peel Regional staff (Morgan-Fraser, Region of Peel, 1993). For Region of Halton, C&D waste was assumed to comprise the same percentage of total waste as in Peel, due to a lack of available data. Table 11.7 summarizes the estimated C&D waste generated by each GTA Region in 1992.

The estimated C&D waste quantities (approximately 595,000 tonnes) were subtracted from the IC&I waste generated in 1992 (approximately 2.796 million tonnes). The remaining 2.201 million tonnes were then allocated to the nine major SIC groupings by the method described earlier.

The waste allocation exercise distributed IC&I waste generation to the various sectors as follows:

• Primary	0.5%
• Manufacturing	25.6%
• Construction & Demolition	21.3%
• Transport, Communication and Utilities (TCU)	5.5%
• Wholesale	6.4%
• Retail	11.6%
• Financial, Insurance and Real Estate (FIRE)	1.7%
• Commercial Services	10.0%
• Non-commercial Services	16.0%
• Public Administration	1.4%

Table 11.8 presents the data at a regional level.

11.4 IC&I Waste Composition Estimates

11.4.1 Waste Categories Used

The composition of the GTA IC&I waste stream was estimated using the following categories:

- Old Corrugated Cardboard (OCC);
- Old Newsprint (ONP);
- Mixed Paper (note: in some cases fine paper fractions have been identified);
- Glass;
- Ferrous Metal;
- Non-ferrous Metal;
- High-density Polyethylene (HDPE);

Table 11.6

Estimated Unit Waste Generation Rates (tonnes/employee/yr)
For the Ten Major IC&I Sectors
By GTA Region, 1992

Major SIC	Description	Unit Waste Generation Rates (tonnes/employee/year)				
		Durham	Halton	Metro Toronto	Peel	York
1	Primary	0.39	0.33	0.83	0.62	0.55
2	Manufacturing	1.56	0.98	1.70	1.78	1.93
3	Construction	*	*	*	*	*
4	TCU	0.56	0.53	0.74	1.09	1.07
5	Wholesale	1.22	0.82	1.40	1.57	1.71
6	Retail	1.09	0.76	1.29	1.11	1.58
7	FIRE	0.19	0.12	0.23	0.25	0.26
8	Non-Commercial	0.75	0.49	0.91	0.90	1.00
9	Commercial	0.86	0.58	0.89	1.06	1.09
10	Public Administration	0.23	0.17	0.29	0.34	0.31
	Overall	1.14	0.89	1.10	1.41	1.58

Notes:
* C&D waste is estimated separately as a percentage of the IC&I waste stream

Table 11.7

Estimate of C&D Waste Generation for Each GTA Region, 1992

Region	C&D % of Total Waste*	C&D % of IC&I Waste	Total IC&I Waste ** (tonnes)	Estimated C&D Waste (tonnes)
Durham	13.15	21.04	189,269	39,822
Halton	16.84	32.0	129,221	41,351
Metro	10.32	17.25	1,517,655	261,795
Peel	16.84	26.3	550,375	144,749
York	17.87	26.2	410,122	107,452
Overall		21.3	2,796,642	595,169

Notes:
* Data for Durham, Metro and York were taken from the *1990 Solid Waste Type and Source Area Declaration Summary Report* published by the Metro Works Department; 1987 C&D waste quantity for Peel was provided by Peel Regional staff (Morgan-Fraser, 1993); Halton was assumed to be the same as Peel because Halton-specific data were not available

** Totals may not add exactly from Regional totals due to rounding

Table 11.8

Estimated Allocation of IC&I Waste Generation to Major IC&I Groups in GTA Regions, 1992

Major SIC	Sector Description	IC&I Waste Generation (tonnes)					
		Durham	Halton	Metro Toronto	Peel	York	GTA Total
1	Primary	1,719	1,120	5,831	2,477	2,990	14,136
2	Manufacturing	62,590	31,735	351,541	169,203	99,717	714,786
4	TCU	9,008	3,492	76,548	49,401	14,662	153,110
5	Wholesale	6,472	6,625	82,038	48,280	34,273	177,688
6	Retail	25,481	16,936	207,343	18,010	57,082	324,851
7	FIRE	1,431	1,103	36,482	4,707	4,518	48,241
8	Non-Commercial	18,488	9,486	189,922	35,348	27,700	280,943
9	Commercial	22,034	16,214	278,534	72,662	59,238	448,683
10	Public Administration	2,220	1,158	27,382	5,528	2,486	38,774
	Total IC&I	149,443	87,868	1,255,620	405,616	302,665	2,201,212

Note: C & D waste was estimated separately as a percentage of the IC&I waste stream

- Polyethtylene Terephthalate (PET);
- Other Plastics;
- Food Wastes;
- Yard Wastes;
- Wood;
- Construction and Demolition (C&D) Wastes (note: in some cases various components in the C&D waste stream have been identified);
- Other Wastes.

These categories are different to those used for the residential sector because the relative quantities of some materials generated in the IC&I sector differ significantly from the residential sector.

Studies in Ontario, including GTA (Gore & Storrie Ltd., 1991, Jacob M., 1993, Proctor & Redfern, SENES, 1991), have shown that food wastes are generated in much greater quantities than yard waste within the IC&I sector. Therefore, this has been reflected by adjusting the relative amounts of food and yard waste in many sectors while leaving the combined composition of organics the same.

C&D waste composition data were taken from reports prepared for Metropolitan Toronto and Environment Canada (Proctor & Redfern, SENES Consultants Ltd., 1991 and SENES, 1993). Table 11.9 shows the C&D waste composition for the construction and demolition sector assumed in this study.

11.4.2 Waste Composition Estimates and Results

Waste composition data were compiled for each sector at the two-digit SIC level from published reports (Gore and Storrie, 1991, Jacob. M., 1993, Proctor & Redfern and SENES, 1991, RIS, CH2M Hill, KPMG, 1993). These data were used to estimate the quantity and composition of waste generated by each 2-digit SIC group in each GTA Region. Quantities of material generated by each 2-digit SIC group were added to estimate the quantities and composition of waste generated by nine major IC&I groups in each Region. The estimates of waste composition by major IC&I group for each Region are presented in Schedule N.

Table 11.10 summarizes the estimated quantities of each material generated within each of the nine major IC&I groups in GTA. The GTA IC&I waste stream generated is estimated to have the following composition (excluding C&D waste):

- paper (mixed plus newspaper) 29.7%
- OCC 15.0%
- metals (8.4% ferrous, 5.3% non-ferrous) 13.7%
- plastics 10.5%
- glass 3.7%
- wood 8.0%
- food and yard 11.1%
- all "other" 8.3%

Overall IC&I waste composition (including C&D waste) is estimated as follows:

- paper (mixed plus newspaper) 23.5%
- OCC 11.8%
- metals (6.7% ferrous, 4.0% non-ferrous) 10.7%
- plastics 8.3%
- glass 2.9%

Table 11.9

Construction and Demolition (C & D) Waste Composition

Material	C&D Waste Composition		C&D Waste Generation	
	Construction Waste	Demolition Waste	Construction Waste (tonnes)	Demolition Waste (tonnes)
Targeted by 3Rs Regulations				
Brick	0.4%	3.5%	476	16,665
OCC	4.5%	0.3%	5,357	1,428
Portlant Cement Concrete	6.9%	3.4%	8,213	16,189
Drywall	8.9%	2.9%	10,594	13,808
Steel	7.9%	4.7%	9,404	22,378
Wood	30.6%	51.8%	36,424	246,638
Sub-Total	59.2%	66.6%	70,468	317,106
Not Targeted by 3Rs Regulations				
Plastic	3.0%	0.7%	3,571	3,333
Building Materials				
Plaster	1.1%	2.3%	1,309	10,951
Shingles	3.5%	1.0%	4,166	4,761
Electrical Wire	1.0%	0.2%	1,190	952
Constr. Paper	0.5%	1.4%	595	6,666
Ceiling Tiles	2.9%	0.0%	3,452	0
Non-ferrous Metal	0.2%	0.5%	238	2,381
Glass	3.5%	0.0%	4,166	0
Asphalt	3.4%	4.2%	4,047	19,998
Fill & Aggregate	12.8%	13.7%	15,236	65,231
Ceramics	0.5%	0.0%	595	0
Other	8.4%	9.4%	9,999	44,757
Sub-Total	40.8%	33.4%	48,566	159,029
Total	100.0%	100.0%	119,034	476,135

Notes:

1. Source: Proctor & Redfern, SENES Consultants Ltd., Solid Waste Environmental Assessment Plan (SWEAP) Discussion Paper No. 4.3, January 1991.
2. Source: SENES Consultants Ltd., Construction and Demolition Waste in Canada: Quantification of waste and Identification of Opportunities for Diversion from Disposal. December, 1993.
3. Demolition projects are not required to separate OCC and drywall
4. Composition represents primarily building-related wastes - road & bridge construction waste (largely asphalt & concrete) represents up to 65% of C&D waste (SENES, 1994)

Table 11.10

Estimated IC&I Waste Generation and Composition
By Major IC&I Sectors (Excluding Construction/Demolition Sector) in GTA, 1992

Major SIC	Description		Waste Composition (tonnes)													
			OCC	ONP	Mixed P	Glass	Ferrous	Non-Ferr	HDPE	PET	Plastic	Food	Yard	Wood	Other	Total
1	Primary	%	18.11%	0.00%	9.51%	0.00%	14.22%	7.60%	0.00%	0.00%	2.36%	0.00%	0.00%	30.25%	17.96%	100.00%
		tonnes	2,560	0	1,344	0	2,010	1,074	0	0	333	0	0	4,276	2,539	14,136
2	Manufacturing	%	13.95%	2.93%	20.60%	1.92%	11.56%	5.89%	0.25%	0.05%	9.09%	4.61%	0.64%	15.85%	12.64%	100.00%
		tonnes	99,747	20,936	147,276	13,714	82,640	42,084	1,780	378	65,001	32,970	4,600	113,328	90,331	714,786
4	TCU	%	13.44%	5.29%	27.78%	3.05%	13.75%	10.11%	1.11%	0.35%	11.49%	2.52%	0.28%	3.67%	7.16%	100.00%
		tonnes	20,576	8,097	42,527	4,670	21,055	15,486	1,699	531	17,593	3,866	424	5,618	10,969	153,110
5	Wholesale	%	27.00%	1.00%	11.50%	0.80%	3.67%	2.17%	0.00%	0.00%	16.70%	5.00%	0.80%	22.00%	9.37%	100.00%
		tonnes	47,976	1,777	20,434	1,422	6,515	3,851	0	0	29,674	8,884	1,422	39,091	16,643	177,688
6	Retail	%	24.46%	11.35%	28.49%	3.68%	2.70%	0.35%	5.86%	0.10%	4.94%	11.94%	0.74%	1.41%	3.99%	100.00%
		tonnes	79,459	36,864	92,535	11,956	8,764	1,137	19,052	320	16,046	38,775	2,414	4,569	12,960	324,851
7	FIRE	%	9.38%	2.04%	51.42%	3.39%	2.64%	2.23%	1.31%	0.64%	7.94%	7.70%	0.65%	1.79%	8.88%	100.00%
		tonnes	4,525	982	24,806	1,633	1,276	1,076	630	310	3,828	3,716	312	863	4,284	48,241
8	Non-Commercial	%	6.61%	4.81%	30.00%	1.77%	11.19%	11.52%	0.20%	0.10%	10.13%	10.00%	6.69%	1.01%	5.96%	100.00%
		tonnes	18,565	13,516	84,283	4,978	31,435	32,358	570	285	28,458	28,094	18,796	2,848	16,757	280,943
9	Commercial	%	11.91%	3.31%	28.87%	9.23%	6.72%	3.98%	2.80%	0.72%	5.94%	21.14%	0.73%	1.39%	3.25%	100.00%
		tonnes	53,435	14,865	129,524	41,424	30,161	17,856	12,570	3,231	26,653	94,873	3,265	6,244	14,582	448,683
10	Public Administration	%	10.00%	0.00%	38.00%	5.00%	3.00%	1.56%	0.00%	0.00%	7.00%	2.00%	0.00%	0.00%	33.44%	100.00%
		tonnes	3,877	0	14,734	1,939	1,163	607	0	0	2,714	775	0	0	12,964	38,774
	All Sectors	tonnes	330,721	97,036	557,463	81,735	185,018	115,529	36,301	5,053	190,302	211,954	31,233	176,838	182,030	2,201,212
		%	15.02%	4.41%	25.33%	3.71%	8.41%	5.25%	1.65%	0.23%	8.65%	9.63%	1.42%	8.03%	8.27%	100.00%

• wood	6.3%
• food and yard	8.7%
• all "other"	6.5%
• C&D	21.3%

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12.0 IC&I SYSTEM WASTE DIVERSION ESTIMATES

12.1 Introduction

Diversion estimates were developed for six IC&I waste diversion systems for the GTA as follows:

IC&I System 1	Existing;
IC&I System 2	Existing/Committed;
IC&I System 3	Extended 3Rs Regulations;
IC&I System 4	Expanded 3Rs Regulations;
IC&I System 5	Expanded 3Rs Regulations with Organics;
IC&I System 6	No Unprocessed Waste To Landfill.

Table 12.1 presents the components of these systems. Components italicized in the Existing and Existing/Committed Systems are those components which must be added to provide the same level of 3Rs service throughout the estudy period (to accomodate projected population increases). Components italicized in Systems 3 to 6 are the components which have been added to the Existing/Committed System which is the base for systems development.

Chapter 3 of this report describes how these systems were developed. Note that IC&I Systems 3 to 5 are generally referred by abbreviated titles of "Extended 3Rs", "Expanded 3Rs" and "Expanded 3Rs with Organics" respectively.

Section 12.2 of this chapter describes each of these systems. Sections 12.3 to 12.8 describe how the diversion estimates for each system were developed.

12.2 IC&I System Descriptions

IC&I System 1 - Existing

This system is based on the IC&I waste management system which was in place in GTA at the end of December 1992. At that time, waste diversion by the IC&I sector was carried out on a voluntary basis. Tipping fees at GTA landfills were $150/tonne for the private sector, causing significant export of waste to the US. A number of landfill bans throughout the GTA also limited the materials which could be disposed in landfills (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.).

Opportunities to recycle were provided to small IC&I generators through some municipally run depots. Two municipalities (Caledon and City of Toronto) provided some municipal collection of IC&I recyclables. Processing of some IC&I recyclables was also provided by some municipally-run MRFs.

Collection and processing of a wide range of source separated dry recyclables from the IC&I sector was provided by many private sector haulers and recyclers, some of which owned and operated processing facilities.

Collection and processing of wet wastes generated by the IC&I sector was provided by the private sector (e.g. centralized windrow composting - Scott's Farm, rendering of food wastes, collection by farmers for landspreading and animal feed, etc.). In addition, redistribution of food wastes from the IC&I sector was carried out through organizations such as Second Harvest and food banks.

Table 12.1
GTA
IC&I System Components

System 1: Existing	System 2: Existing/Committed	System 3: Extended 3Rs Regulations	System 4: Expanded 3Rs Regulations	System 5: Expanded 3Rs Regulations with Organics	System 6: No Unprocessed Waste to Landfill
IC&I Collection – Dry Wastes • Voluntary source separation of dry recyclables by some IC&I generators • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers. • Curbside collection of IC&I recyclables in some areas by municipal forces. • IC&I depots at transfer stations for use by small business generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.).	**IC&I Collection – Dry Wastes** • Voluntary source separation of dry recyclables by some IC&I generators • Mandatory source separation of designated materials by designated major generators (3Rs regulations) • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.)	**IC&I Collection – Dry Wastes** • *Mandatory source separation of designated materials by most IC&I generators in GTA (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)* • Voluntary source separation of dry recyclables by small IC&I generators • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.)	**IC&I Collection – Dry Wastes** • Voluntary source separation of dry recyclables by some small IC&I generators • *Mandatory source separation of expanded list of designated materials by most IC&I generators (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)* • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.)	**IC&I Collection – Dry Wastes** • Voluntary source separation of dry recyclables by small IC&I generators • *Mandatory source separation of expanded list of designated materials by most generators (to capture generators of 90% of total IC&I waste - revision to 3Rs regulations)* • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.)	**IC&I Collection – Dry Wastes** • Voluntary source separation of dry recyclables by small IC&I generators • Mandatory source separation of designated materials by designated major generators (3Rs regulations) • Collection of source separated dry recyclables from the IC&I sector by private sector haulers and recyclers • Curbside collection of IC&I recyclables in some areas by municipal forces • IC&I depots at transfer stations for use by small business generators • Community Recycling Centres for use by small quantity IC&I generators • Landfill bans on specified materials (e.g. wood, tires, drywall, scrap metal, white goods, fine paper etc.) • *Mandatory processing of all dry wastes prior to landfilling (new policy required by Ontario, or condition on C of A for landfill)*
IC&I Collection – Wet Wastes • Voluntary source separation of IC&I wet wastes • Separate collection of IC&I wet wastes	**IC&I Collection – Wet Wastes** • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes	**IC&I Collection – Wet Wastes** • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes	**IC&I Collection – Wet Wastes** • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes	**IC&I Collection – Wet Wastes** • *Mandatory source separation of wet wastes by designed IC&I generators (revision to 3Rs regulations)* • Voluntary source separation of IC&I generated organics • Separate collection of IC&I wet wastes	**IC&I Collection – Wet Wastes** • Voluntary source separation of IC&I generated organics • Separate collection of some IC&I wet wastes

Table 12.1
GTA
IC&I System Components

System 1: Existing	System 2: Existing/Committed	System 3: Extended 3Rs Regulations	System 4: Expanded 3Rs Regulations	System 5: Expanded 3Rs Regulations with Organics	System 6: No Unprocessed Waste to Landfill
IC&I Processing – Dry Wastes • Processing of specific dry materials (e.g. C&D wastes, wood, drywall etc.) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs. • Processing of IC&I sector recyclables by small private sector recyclers	**IC&I Processing – Dry Wastes** • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers	**IC&I Processing – Dry Wastes** • *Additional processing capacity for dry recyclables required* • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for a wide range of dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers	**IC&I Processing – Dry Wastes** • *Additional processing capacity for wider list of dry materials required* • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers	**IC&I Processing – Dry Wastes** • *Additional processing capacity for dry recyclables* • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers	**IC&I Processing – Dry Wastes** • Processing of specific dry materials (e.g. C&D wastes, wood, drywall) in specially designed facilities. • Processing centres for dry recyclables collected from the IC&I sector, owned by the private sector and operated by private sector staff • Processing of IC&I sector recyclables in municipal MRFs • Processing of IC&I sector recyclables by small private sector recyclers • *Mandatory processing of all dry wastes prior to landfilling (new policy)* • *Mandatory processing of all mixed wastes prior to landfilling (new policy)* • *Additional facilities for processing dry recyclables* • *Additional facilities for processing mixed wastes*
IC&I Processing – Wet Wastes • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector	**IC&I Processing – Wet Wastes** • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector	**IC&I Processing – Wet Wastes** • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector	**IC&I Processing – Wet Wastes** • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector	**IC&I Processing – Wet Wastes** • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Centralized composting of IC&I organics in in-vessel system • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector • *New composting facility (in-vessel) for IC&I organics*	**IC&I Processing – Wet Wastes** • Centralized windrow composting of source-separated IC&I organics • On-site composting of source separated organics generated by the IC&I sector • Vermicomposting at some IC&I locations • Rendering of food wastes from IC&I sector • *New composting facility (in-vessel) for IC&I organics*

Table 12.1
GTA
IC&I System Components

System 1: Existing	System 2: Existing/Committed	System 3: Extended 3Rs Regulations	System 4: Expanded 3Rs Regulations	System 5: Expanded 3Rs Regulations with Organics	System 6: No Unprocessed Waste to Landfill
IC&I Reuse • Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs • Community-based reuse programs for small IC&I generators • Use of food wastes as animal feed • Use of food waste for human consumption • Landspreading of IC&I organics • Refilling of IC&I containers and packaging (e.g. refillable bottles, refillable pails or drums, etc) • Use of re-usable packaging (e.g. reusable plastic and wood pallets)	**IC&I Reuse** • Reuse by IC&I generators, through the Canadian, provincial and local waste exchange programs • Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators • Use of food wastes as animal feed • Use of food waste for human consumption • Landspreading of IC&I organics • Use of refillable containers (refillable bottles, refillable pails or drums, etc.) • Use of re-usable packaging (e.g. reusable plastic and wood pallets)	**IC&I Reuse** • Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs • Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators • Use of food wastes as animal feed • Use of food waste for human consumption • Landspreading of IC&I organics • Use of refillable containers (refillable bottles, refillable pails or drums) • Use of re-usable packaging (e.g. reusable plastic and wood pallets)	**IC&I Reuse** • Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs • Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators • Use of food wastes as animal feed • Use of food waste for human consumption • Landspreading of IC&I organics • Use of refillable containers (refillable bottles, refillable pails or drums) • Use of re-usable packaging (e.g. reusable plastic and wood pallets)	**IC&I Reuse** • Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs • Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators • *Increased use of food wastes as animal feed* • *Increased use of food waste for human consumption* • *Increased landspreading of IC&I organics* • Use of refillable containers such as packaging by businesses (refillable bottles, refillable pails or drums, etc.) • Use of re-usable packaging (e.g. reusable plastic and wood pallets)	**IC&I Reuse** • Reuse by IC&I generators, through the Canadian, Provincial and local waste exchange programs • Community-based reuse programs and Community Recycling Centres with reuse programs for small IC&I generators • Use of food wastes as animal feed • Use of food waste for human consumption • Landspreading of IC&I organics • Use of refillable containers (refillable bottles, refillable pails or drums, etc) • Use of re-usable packaging (e.g. reusable plastic and wood pallets, etc.)
IC&I Reduction • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse	**IC&I Reduction** • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations) • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations)	**IC&I Reduction** • Voluntary waste reduction actions by IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • *Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations)* • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations)	**IC&I Reduction** • Voluntary waste reduction actions by small IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • *Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations)* • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations)	**IC&I Reduction** • Voluntary waste reduction actions by small IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • *Mandatory development of waste reduction action plans by most IC&I generators (revision to 3Rs regulations)* • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations)	**IC&I Reduction** • voluntary waste reduction actions by small IC&I generators • Voluntary reduction of packaging waste by the year 2000 (NAPP) - this includes reuse • Mandatory development of waste reduction action plans by designated major IC&I generators (defined in 3Rs regulations). • Mandatory development of packaging reduction action plans by designated major packaging generators (defined in 3Rs regulations).

Table 12.1
GTA
IC&I System Components

System 1: **Existing**	**System 2:** **Existing/Committed**	**System 3:** **Extended 3Rs Regulations**	**System 4:** **Expanded 3Rs Regulations**	**System 5:** **Expanded 3Rs Regulations with Organics**	**System 6:** **No Unprocessed Waste to Landfill**
IC&I Programs • Voluntary waste audits performed by IC&I generators • Independent voluntary waste reduction programs in private companies • Voluntary packaging reporting by packaging users (NAPP)	**IC&I Programs** • Voluntary waste audits performed by IC&I generators • Independent voluntary waste reduction programs in private companies • Mandatory waste audits by designated major IC&I generators (3Rs regulations) • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP)	**IC&I Programs** • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in private companies • *Mandatory waste audits by most IC&I generators (revision to 3Rs regulations)* • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP)	**IC&I Programs** • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in private companies • *Mandatory waste audits by most IC&I generators (revision to 3Rs regulations)* • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP)	**IC&I Programs** • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in small private companies • *Mandatory waste audits by most IC&I generators (revision to 3Rs regulations)* • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP)	**IC&I Programs** • Voluntary waste audits performed by small IC&I generators • Independent voluntary waste reduction programs in small private companies • Mandatory waste audits by designated major IC&I generators (defined in 3Rs regulations) • Mandatory packaging audits by designated major packaging generators (3Rs regulations) • Voluntary packaging reporting by packaging users (NAPP)
IC&I Promotion & Education • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations	**IC&I Promotion & Education** • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations)	**IC&I Promotion & Education** • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • *Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations)*	**IC&I Promotion & Education** • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • *Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations)*	**IC&I Promotion & Education** • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • *Mandatory posting of waste reduction plans for review by employees of most IC&I generators (revision to 3Rs regulations)*	**IC&I Promotion & Education** • Promotion/education programs focused on reducing waste disposed by the IC&I sector, carried out by the regional municipality • Promotion/education of IC&I waste reduction by non-profit organizations • Promotion/education of IC&I waste reduction by associations • Mandatory posting of waste reduction plans for review by employees of designated major IC&I generators (3Rs regulations)

Various facilities provided exchange services (e.g. Ontario Waste Exchange, local waste exchange program in Durham, WASTEWISE, Halton, etc.)

Voluntary waste reduction initiatives were pursued by individual IC&I establishments. These include implementation of source separation and recycling programs, carrying out waste audits, and developing waste reduction action plans, which included reduction, reuse and recycling elements.

The National Packaging Protocol (NAPP), a federal initiative, required that packaging waste generation be reduced by 50% by the year 2000, measured against a 1988 baseline. NAPP is a voluntary program at this time. Private sector companies were complying with the spirit of NAPP on a voluntary basis as of the end of 1992.

IC&I System 2 - Existing/Committed

The Existing/Committed System includes the Existing System described above, and also the estimated impacts of any policy commitments announced at the local, regional, provincial and federal level by the end of 1992. These include the Ontario 3Rs Regulations which were promulgated under the Environmental Protection Act (March 3, 1994), the National Packaging Protocol (NAPP) and the Canadian Industry Packaging Stewardship Initiative (CIPSI).

CIPSI is a product stewardship program that has been organized by a coalition of leading Canadian manufacturers, material suppliers, and retailers. This group has proposed a national recycling program to achieve a 50% reduction in all packaging going to disposal. A key element of the CIPSI plan is to provide economic incentives which reward the use of highly recyclable materials . CIPSI encompasses a significant market development component and proposes a system of industry levies in which each industry member pays a fee in proportion to the actual costs of managing their packages. This model would incorporate market development incentives with a rebate paid to industry members who are able to utilize secondary packaging.

The CIPSI model has been under discussion in Manitoba, and is currently under negotiation in Ontario, B.C. and Nova Scotia. If implemented, backdrop Regulations would likely be developed that require all companies who sell consumer products in a province to belong to an organization which recovers and recycles the used packaging. Both NAPP and CIPSI are ongoing initiatives that are likely to have a significant impact on diversion and recovery of packaging waste. The actual contribution to reduction can not be quantified at this time, as the details of the plan are not public (April, 1994).

There are three requirements for IC&I waste generators under the 3Rs Regulations (Ministry of Environment and Energy, March 3, 1994). Designated major generators must:

- carry out waste audits and develop and implement waste reduction action plans;
- implement source separation programs;
- designated manufacturing facilities and importers must carry out packaging audits and develop and implement packaging reduction work plans.

GTA IC&I facilities affected must comply with the 3Rs Regulations by September 1994.

Designated Major Waste Generators

The 3Rs Regulations will apply only to those IC&I establishments which are designated major waste generators. These include:

- retail shopping establishments with a floor area of at least 10,000 sq. m.;
- retail shopping complexes with a floor area of at least 10,000 sq. m.;

- construction projects with a total floor area of at least 2,000 sq. m.;
- demolition projects with a total floor area of at least 2,000 sq. m.;
- office buildings with a total floor area of at least 10,000 sq. m.;
- multi-family complexes containing 6 or more units;
- restaurants, if the total annual sales for all restaurants operated in Ontario by the owner equalled or exceeded $3 million in a calendar year within the previous two years;
- hotels and motels which have more than 75 units;
- hospitals classified as A, B, or F in Regulation 964;
- educational facilities with enrollment of 350 persons or greater;
- manufacturing facilities with employees that have worked, in total, in excess of 16,000 hours in any calendar month during the two preceding calendar years.

Source Separation Requirements

The Regulations require that designated major generators of IC&I waste implement a source separation program covering a number of materials. Collection, handling and storage facilities must be provided for the materials specified. The generator must make reasonable efforts to ensure that source separated materials are reused or recycled.

The list of materials that is required to be separated varies among the different sectors, and is as follows:

Retail, office buildings, hospitals, educational	**Restaurants, hotels and motels**
• aluminum food and beverage cans • corrugated cardboard • fine paper • glass bottles and jars for food and beverages • newsprint • steel food and beverage cans	• aluminum food and beverage cans • corrugated cardboard • fine paper • glass bottles and jars for food and beverages • newsprint • steel food and beverage cans • PET
Multi-unit residential	**Large manufacturing**
• aluminum food and beverage cans • glass bottles and jars for food and beverages • newsprint • steel food and beverage cans • PET • other materials collected by local Blue Box program	• aluminum • corrugated cardboard • fine paper • glass • newsprint • steel • PET • HDPE, (jugs, crates, pails, totes and drums) • LDPE and LLDPE film • polystyrene foam • polystyrene trays, reels and spools • wood
Construction	**Demolition**
• brick and Portland cement • corrugated cardboard • drywall • steel • wood	• brick and Portland cement • steel • wood

Waste Audits and Waste Reduction Workplans

The designated major generators must also carry out waste reduction audits and develop waste reduction work plans. These must be posted and communicated to employees. They must be maintained on premises and submitted to the MOEE upon request.

Packaging Audits and Packaging Reduction Workplans

Under the 3Rs Regulations, large manufacturers of food, beverages, paper and chemical products (in SIC 10, 11, 27, and 37) with employees that have worked, in total, in excess of 16,000 hours in any calendar month during the two preceding calendar years; and importers of those categories with annual sales in excess of $20 million, must carry out packaging audits and develop packaging reduction work plans. These must be done at least every two years. They must be summarized and communicated to employees.

Discussions with haulers and recyclers suggest that the existing infrastructure in GTA will be able to handle the increased quantities of source separated materials requiring collection and processing under the requirements of the 3Rs Regulations. Private sector haulers and recyclers are expected to be able to provide the increased services required. Existing processing capacity can likely handle the increased flow of materials, hence no new processing facilities are likely to be required.

IC&I System 3 - Extended 3Rs Regulations

This system is built on System 2, but would require a change in policy to extend the requirements of the 3Rs Regulations to include a significantly larger number of IC&I waste generators.

In this system, the 3Rs Regulations would be extended as follows:

- the waste related requirements of the 3Rs Regulations (on source separation of OCC, ONP, fine paper, glass, ferrous and non-ferrous metal food and beverage containers), and also on mandatory waste auditing and waste reduction planning would be extended to cover all IC&I generators who account for 90% of the IC&I waste generated in Ontario;

- IC&I generators who account for 90% of the IC&I waste generated within the manufacturing sector in Ontario would be required to source separate a longer list of materials (required only of major manufacturers in the current 3Rs Regulations) which would include: aluminum, OCC, fine paper, glass ONP, steel, PET, HDPE, LDPE and LLDPE film, polystyrene and wood. Mandatory waste auditing and waste reduction planning would also be required of these generators;

- the requirements for source separation of brick, OCC, Portland concrete cement, drywall, steel and wood, and waste reduction work plan development would also extend to a much larger number of construction/demolition projects. Again, the cut off criterion would be chosen so that generators of 90% of C&D waste would be subject to the Regulations. It is estimated that these requirements would result in many smaller construction and demolition contractors having to comply with the Regulations on smaller construction and demolition projects;

- in addition, food service and accommodation establishments would be required to source separate PET;

- the packaging provisions in the 3Rs Regulations would remain unchanged, and would apply only to major generators (in which the hours worked by employees in any month over the previous two years exceeded 16,000 hours) in the SICs currently involved (SIC 10, 11, 27 and 37), and importers of these products (with annual sales in excess of $20 million).

It is probable that 60-70% of IC&I generators or less likely account for 90% of IC&I waste generated in Ontario, although this can not be confirmed with the data available at this time. Choosing the 90% cut-off for extension of the 3Rs Regulations is estimated to relieve many small IC&I generators of the requirements of the extended 3Rs Regulations. If 100% of all IC&I generators were required to comply with the extended 3Rs Regulations, it would require significant effort on the part of many very small IC&I establishments, with marginal benefit in terms of increased waste diversion. Covering generators of 90% of the waste stream under the extended 3Rs Regulations is considered a more appropriate approach. This is similar to the municipal 3Rs Regulations, requiring communities with populations over 5,000 or more to provide recycling services to 90% of Ontario's population.

Each of the IC&I generators impacted by the extended 3Rs Regulations would be required to institute source separation programs in their facilities. This would likely require the purchase of a number of recycling bins by each IC&I generator, for placement at strategic locations throughout the facility. Design of a recycling system for the facility, and development of a training program for facility staff, in order that they understand which materials go into which bins, would also be required.

The extent to which materials would be source separated in the IC&I facility would depend on the hauler or recycler which services the IC&I facility. Some companies require separation into a number of different streams (e.g. glass, metal, plastic, fine paper, OCC, etc.) whereas other hauling/recycling companies use a two-bin system.

Because the total processing capacity of the existing private sector recycling system is not known (private sector companies contacted during this study were reluctant to divulge this information), it is unknown what expansions would be necessary to provide the additional capacity required. Also, the existing capacity of the private sector to provide recycling services is not known accurately, therefore the level of expansion of collection services necessary to meet the requirements of the extended 3Rs Regulations can not be accurately estimated. The private sector would likely respond to provide the additional services and processing capacity required under this system, and always indicate their willingness and desire to do so. On this basis it is reasonable to assume that adequate capacity for source separated material collection and processing will be available in GTA.

An aggressive market development policy would be required to ensure that stable markets were created for the larger quantities of dry recyclables which would enter the secondary materials markets under this system. Market development policies which could be considered include: mandatory recycled content for a number of products (particularly packaging), mandatory purchasing specification development at all levels of government to create incentives for secondary material market development, support of green industries using secondary materials as feedstock, etc.

IC&I System 4 - Expanded 3Rs Regulations

This system is built on System 3 (Extended 3Rs Regulations), and would require the source separation of a larger range of dry materials. System 4 would apply to IC&I generators who account for generation of 90% of the IC&I waste stream (the same group as for System 3). Identification of generators which would be involved was not carried out as part of this study,

but it would likely apply to 60 to 70% of GTA generators. The Extended 3Rs Regulations system would require that the generators impacted source separate the following materials: aluminum, OCC, fine paper, glass, newsprint, steel, PET, HDPE, LDPE and LLDPE film, polystyrene, wood, and other paper products (which include boxboard and mixed papers).

The existing 3Rs infrastructure would likely require some expansion to handle the new materials which would be recycled under this system. Some new facilities (MRFs to handle a wide array of dry recyclables) and additional collection capacity (for dry recyclables) would be required. The additional plastics recovered in this system will require initiatives to encourage the development of cost effective separation and processing technologies.

This system would also require aggressive market development policies and actions to ensure that stable markets are created for the larger quantities of dry recyclables which would enter the secondary materials markets.

IC&I System 5 - Expanded 3Rs Regulations with Organics

This system is built on Systems 4 (Expanded 3Rs Regulations), and additionally would include wet wastes, or organics (7-8% of the GTA IC&I waste stream) in the regulated list of materials requiring source separation by the IC&I sector. Because most IC&I food wastes are generated by a few IC&I sectors (most notably food manufacturers, grocery stores, restaurants, hotels, hospitals, schools, etc.) the Regulations would be structured to capture generators of 90% of the IC&I organic waste stream, by targeting a few sectors. In addition, significant IC&I generators of yard waste (landscapers, garden maintenance companies, etc.) would be required to source separate and divert these materials from disposal.

Many IC&I food waste generators would have to implement source separation programs for food wastes. New recycling bins would have to be purchased and located strategically in kitchen and food preparation areas. Staff would be trained to put food waste into designated separate bins.

In many cases, a separate company (to the hauler/recycler used for dry recyclables) may handle the source separated organics, which will require frequent removal from the property, because of potential odour generation. Where feasible, efforts may be made to compost the source separated food wastes on site.

Options for food waste diversion include use as human food, animal feed, landspreading, rendering, composting and anaerobic digestion. The use of food banks and organizations such as Second Harvest would likely increase, depending on any health department restrictions involved. Existing landspreading and animal feed capacity within a reasonable distance of GTA are fixed, and are not easily expanded. Rendering capacity can be expanded considerably, but may not be cost competitive with other management options. Existing composting capacity may be adequate, (depending on what proportion of the source separated waste was composted and whether some private sector facilities in the planning stages at this time will be constructed).

Source separation and diversion of organic (predominantly green) wastes by IC&I generators such as landscapers and garden maintenance companies is likely easier, as most of their waste is relatively homogeneous. Options in this case would be limited to direct land application, composting or anaerobic digestion.

IC&I System 6 - No Unprocessed Waste to Landfill

This system is built on the Existing/Committed IC&I System, including the requirements of the provincial 3Rs Regulations and would require that all IC&I waste be processed prior to

landfilling. New legislation mandating this requirement would be necessary, or the same result would be achieved if this requirement were included in the Certificate of Approval for GTA landfills.

There are a number of ways in which this system could and probably would operate. Major generators subject to the 3Rs Regulations would implement source separation programs. For wastes from other generators, haulers/recyclers would have the option of either requiring some level of source separation by their facility accounts, or picking up only one bin of mixed waste (garbage). The applicability of each approach might depend on the size of the account and the overall economics of extensive material separation versus disposing of all waste into one bin.

The level of processing carried out would depend on the wording of the Regulations, and the economics of additional processing versus minimal processing and subsequent disposal from the haulers/recycler's point of view.

High processing and disposal costs might encourage increased source separation and negotiation of separate contracts for different materials on economic grounds. There are examples of this approach in the Existing System, where companies source separate OCC and negotiate for its separate collection by brokers. Also, some food service facilities allow farmers to haul away source separated food wastes at zero or minimal costs.

A variety of methods would be used to meet the requirements of this system. The combinations would include some source separation, and some processing of mixed waste. It would likely require additional processing facilities in the GTA for both source separated and mixed IC&I wastes (including specialized facilities for C&D waste).

The costs of waste management would increase, particularly for companies who opt for disposing of mixed waste without any source separation.

12.3 Estimates of Waste Diversion Rates by the IC&I Existing System

12.3.1 Approach to Estimating Current Waste Diversion Levels

Determining current diversion levels achieved by the GTA IC&I sector is a difficult task. Unlike diversion in the residential sector, where data are maintained by local and regional municipalities, there are no central data sources maintained on diversion by the IC&I sector. IC&I waste management is carried out by the private sector, and there are currently no data reporting requirements in place.

The Ontario Waste Management Association (OWMA) conducted a survey of its membership in March, 1991 which estimated that the IC&I diversion rate for the GTA was 17.8% and was expected to reach 23.7% in September, 1991. A second survey was conducted in 1993 to determine recycling levels for 1992, and will be the best source of available data from the Association (Crawford, 1993). The detailed survey results had not been released at the time of writing (May 1994).

A number of approaches were used to estimate 1992 IC&I waste diversion activity in the GTA. These included:

- Literature search;
- Survey of associations representing major IC&I sectors;
- Survey of representative number of GTA recycling companies;
- Survey of IC&I generators;
- Telephone survey of GTA Regional staff;
- Theoretical estimate based on assumed diversion rates for different materials.

The results of some of these efforts are described in Schedule O and are summarized below.

Literature Search

A literature search was conducted to collect any published data on diversion activity available at the regional or IC&I sector level. Very little information was identified through this effort, though some published studies were obtained with useful information. These include:

- MacViro Consultants Inc. 1992. *Preliminary Study of Construction and Demolition Waste Division Constraints and Opportunities.*
- National Taskforce on Packaging. *National Packaging Surveys*. 1988, 1990 and 1992
- articles on specific recycling activities such as, *Glassmaker Reports Large Jump in Recovery Rates*, in Recycling Canada, Feb. 1993

Numerous case studies of successful IC&I waste diversion programs were identified. However the degree to which these efforts represented efforts by the industry as a whole could not be determined, therefore the information contained in the case studies was of limited applicability to this study.

Telephone Survey of GTA Regional staff

A telephone survey was conducted of regional staff in GTA to collect any data on current levels of recycling by the IC&I sector at the regional level. The results of this survey are presented in Schedule O. However, very little information was available and the results of this survey did not contribute to a clearer picture of recycling levels by each of the major IC&I sectors in GTA.

Survey of IC&I Sector Associations

The Study Team conducted a telephone survey of associations representing industrial and commercial groups in GTA in February and March, 1993. Since data on waste generation was allocated to ten major IC&I sectors, as detailed in Chapter 11 of this document, IC&I establishments and associations which represented each of these ten sectors were surveyed.

The results of this survey are presented in Schedule O. They indicate that 3Rs activity varies widely among all sectors. While some associations had information on the waste management practices of their membership, and some were even playing a role in promoting greater awareness, the information was generally very limited and was insufficient to gain a reliable picture of the current levels of recycling in the IC&I sector.

Survey of Recycling Companies

There are over 220 private sector companies providing a range of hauling, processing and marketing services for IC&I wastes in GTA (RCO, 1992). A complete listing of all IC&I recycling companies in GTA is available through the Recycling Council of Ontario (RCO, 1992). The general structure of the existing IC&I waste management system in GTA is presented in Schedule O.

A representative number (approximately 60 of the 220) of companies providing a range of hauling, processing and marketing services in GTA was selected for a survey to determine quantities of material handled in 1992 (the survey questionnaire is included in Schedule O). Of the 60 companies targetted, 54 companies were reached, and 37 provided some level of response. Information was obtained from two of the largest companies, 5 middle-level and 30 small hauling and recycling companies. Most private haulers and recyclers contacted were unwilling to divulge proprietary information concerning their operations and capacities, however, indications of recycling activity for some materials were provided.

Of the 54 companies contacted 28 companies provided data on the tonnages of materials diverted in 1992. The 28 responding companies diverted an estimated 633,000 tonnes of waste in GTA in 1992. A similar number provided information on the number of IC&I accounts handled in 1992. The total number of accounts handled by approximately 28 responding companies was approximately 14,000. Of the 54 companies contacted, 31 reported employing 860 people.

Survey of IC&I Sector Generators

The Study Team also conducted a telephone survey of a number of the major IC&I sector generators in GTA in February and March, 1993. Establishments representing the ten major IC&I sector categories used in Chapter 11 were contacted.

The results of this survey are presented in Schedule O. More detailed information was obtained from individual generators than from the survey of associations. The IC&I generator survey indicated that awareness of potential opportunities for waste reduction and recycling is growing in the IC&I sector in GTA. Significant results have been achieved in virtually every sector. However, the survey indicates that the level of 3Rs activity varies widely among and within all sectors, so that effective organization and summary of the information to determine an average waste diversion rate by sector was not possible.

Theoretical Estimate of Diversion

Since the aforementioned surveys provided little information toward a comprehensive picture of the current levels of IC&I waste diversion in GTA, the Study Team used an approach which estimates diversion in GTA based on assumed diversion rates for different materials. Based on the limited information available from research to date, preliminary estimates of diversion were developed for each material category. Waste composition estimates presented in Chapter 11 were used for this task. This methodology, and the results obtained, are presented in Section 12.3.2

12.3.2 Theoretical Diversion Estimate for IC&I System 1 – Existing

The composition of the GTA IC&I waste stream was estimated using the following categories:

- Old Corrugated Cardboard (OCC);
- Old Newsprint (ONP);
- Mixed Paper (note: in some cases fine paper fractions have been identified);
- Glass;
- Ferrous Metal;
- Non-ferrous Metal;
- High-density Polyethylene (HDPE);
- Polyethylene Terephthalate (PET);
- Other Plastics;
- Food Wastes;
- Yard Wastes;
- Wood;
- Construction and Demolition (C&D) Wastes (note: in some cases various components in the C&D waste stream have been identified);
- Other Wastes.

These categories are different to those used for the residential sector because the relative quantities of some materials generated in the IC&I sector differ significantly from the residential sector.

The assumed diversion rates used for this analysis, expressed as percentage diverted for each material, are summarized in Table 12.2. The estimated quantities of each material diverted, in tonnes, are presented in Table 12.3. The rationale for these estimates is presented below.

It should be stressed that these percentages are best estimates of the current recycling activity based on information obtained from research to date. There is some uncertainty in these assumed diversion rates. An estimated overall diversion rate of approximately 28% is estimated for the Existing IC&I System, based on the assumptions used.

The assumptions used to estimate current diversion rates are discussed by material below.

- **OCC**: Old corrugated cardboard has one of the highest product recovery rates (primarily through the IC&I sector) (Apotheker, March 1993). NAPP reported that 61% of OCC packaging is recycled in Ontario (NAPP, 1990 Survey) and noted that 96% of paper packaging sent for recycling is OCC from all industry sectors (NAPP, 1990 Survey). An earlier NAPP study reported a 35% recycling rate of OCC (NAPP, 1988 survey). One end market source contacted by the Study Team thought an estimate of 60% was not unreasonable (confidential source). A US study by AIA in 1993, indicated that 70% of OCC recycled in the commercial and retail sectors, the largest users of OCC, is recycled by the largest generators (AIA, 1993). Since bans on disposal of OCC in landfills have been in place since 1989, a high diversion rate can be expected.

  Therefore, an initial estimate of 60%, representing an estimated 198,000 tonnes of OCC is assumed to have been diverted in GTA in 1992.

- **Fine Paper**: The surveys carried out by the Study Team for this study indicate that a substantial number of recycling programs are in place in commercial and office establishments in GTA. Pitney Bowes conducted a survey of its customers in 1992 which showed that 72% of offices in Ontario have recycling programs (Pitney Bowes, 1992). Fine paper is a significant portion of that office waste (Gore & Storrie, 1991). Also, according to Franklin & Associates, in 1990 collection of fine paper from offices in the U.S. was estimated to be 16% of the available fine paper (Franklin & Associates, 1991). It is believed that in GTA the office recycling activity represents a higher concentration of office recycling programs and involves significant quantities of fine paper.

  Therefore, an estimate of a 75% recycling rate for fine paper has been assumed (this may be high). Based on available information on fine paper fractions of waste paper streams (Gore & Storrie, 1991, Proctor & Redfern, SENES, 1991), it is estimated fine paper represents roughly 17% of the mixed paper stream. It was estimated that approximately 94,000 tonnes of fine paper were generated in GTA in 1992. With an assumed recycling rate of 75%, roughly 70,000 tonnes of fine paper is estimated to have been recycled in GTA in 1992.

- **ONP**: Most ONP is generated by the residential sector. An estimated 40% of available ONP was recycled in Canada in 1991, and more than 50% of available supply was recovered in Ontario (CDNA, 1992). IC&I sector recycling of ONP is assumed to be less. Pre-consumer sources of ONP in the IC&I sector have always been recycled. For post-consumer ONP recovery programs, such as that conducted by the Toronto Transit Commission (TTC, 1988), recovery is assumed to be relatively low. The Ontario Paper Fibre Strategy Team estimated that approximately 35% of ONP was recycled in the IC&I sector (Ontario Paper Fibre Strategy Team, 1993).

Table 12.2

Assumed Diversion Rate of GTA IC&I Waste Stream By Material in 1992

Material	Assumed Current Diversion Rate (% of generated)
OCC	60%
ONP	35%
Fine Paper	75%
Mixed Paper	15%
Glass	18%
Ferrous	20%
Non-ferrous	20%
HDPE	10%
PET	10%
Other Plastics	3%
Food	1%
Yard	1%
Wood	50%
Other	5%
C&D	
— Brick	30%
— OCC	50%
— Concrete	30%
— Drywall	30%
— Steel	60%
— Wood	60%
— Other	5%

Note: All of the above estimates are based on limited available information, described in Section 12.3.2 by material, but are considered to provide a reasonable preliminary estimate of the potential range of the effects of the 3Rs regulations and NAPP for the Existing/Committed IC&I System. Information on markets by material is presented in Schedule H of the Service Technical Appendix.

Table 12.3

Estimate of Diversion of IC & I Waste
Under Existing System
Greater Toronto Area
1992

Waste Component	Estimated IC&I Waste Generated (tonnes) 1992 (column 1)	Estimated IC&I Diversion (tonnes) Existing 3R 1992 (column 2)	Estimated IC&I Diversion Rate (%) 1992	Estimated IC&I Waste Disposed (by difference) (tonnes) 1992	Estimated Composition of Disposed IC&I Waste (%) 1992
Total IC&I Waste (tonnes)	2,796,381				
Paper					
Newspaper	97,036	33,963	35.0%	63,074	3%
Corrugated cardboard (OCC)	330,721	198,433	60.0%	132,288	7%
Fine Paper		70,240			
Mixed paper (1)	557,463	115,952	33.4%	371,270	19%
Subtotal (Paper)	985,220	418,588	42.5%	566,632	28%
Glass	81,735	14,712	18.0%	67,023	3%
Ferrous	185,018	37,004	20.0%	148,014	7%
Non-ferrous	115,529	23,106	20.0%	92,423	5%
Subtotal (Metal)	300,546	60,109	20.0%	240,437	12%
Plastic					
PET	5,053	505	10.0%	4,548	0%
HDPE	36,301	3,630	10.0%	32,671	2%
Other Plastic	190,302	5,709	3.0%	184,593	9%
Subtotal (Plastic)	231,656	9,845	4.2%	221,812	11%
Organics					
Food wastes	211,954	2,120	1.0%	209,835	10%
Yard waste	31,233	312	1.0%	30,920	2%
Subtotal (Organics)	243,187	2,432	1.0%	240,755	12%
Wood Waste	176,838	53,051	30.0%	123,786	6%
Construction/Demolition Waste					
Brick,OCC,Conc,Drywl,Steel,Wood	387,574	212,761	54.9%	174,813	9%
Other	207,595	10,380	5.0%	197,215	10%
Subtotal (C&D)	595,169	223,141	37.5%	372,028	19%
Other	182,030	9,101	5.0%	172,928	9%
TOTAL	**2,796,381**	**790,979**	**28.3%**	**2,005,402**	**100%**

Notes:
1. Includes some fine paper of some sectors
2. All diversion estimates illustrated using assumed 1992 data.

Therefore, an estimate of 35%, representing approximately 34,000 tonnes of ONP, has been assumed to have been recycled in the IC&I sector in GTA in 1992.

- **Mixed Paper**: This category includes fine paper (factored out in this analysis since it is specifically targetted in the provincial 3Rs Regulations), various post-consumer boxboards, some post-consumer OMG, various kraft used in packaging, envelopes, polycoat packaging and fibre cores. While the markets for these secondary materials may be growing with the introduction of new technology and greater demand for other secondary fibres such as ONP, markets still are limited.

  A number of the office recycling programs in GTA offered by private recycling companies (Laidlaw, Metro Waste Paper, WMI) collect a mixed paper stream. This would tend to increase the recycling levels of lower value fibres.

  However, mixed paper is a broad category of waste fibres and includes materials such as fibre cores which have a high weight, and kraft from various sources. These are expected to have significantly lower recycling rates but their contribution to the waste stream is not known at this time. NAPP noted that 96% of paper packaging sent for recycling is OCC from all industry sectors (NAPP, 1990 survey). Data from its 1992 survey suggest that approximately 30% of fibres other than OCC (packaging groups 42 to 48) are reused or recycled (data supplied by Environment Canada, 1994). NAPP 1992 survey results indicate significantly higher levels of recycling of fibre used in packaging over results in 1988 (National Taskforce on Packaging, 1994). According to the Paper Fibre Strategy Team the diversion of boxboard is unknown (Ontario Paper Fibre Strategy Team, 1993).

  Therefore, an initial estimate of 25%, representing roughly 82,000 tonnes of mixed paper (other than fine paper, OCC and ONP) has been assumed to have been diverted in GTA in 1992 (this may be high).

- **Glass**: Consumers Glass of Etobicoke estimates that 324,500 tons of glass cullet is available in Ontario, of which 80% is residential, and 20% IC & I (64,900 tonnes) (Paradiso, 1993). Consumers Glass also estimated that it recovered approximately 5,620 tonnes of glass from IC&I programs in Ontario in 1991 (Recycling Canada, 1993).

  NAPP in its 1988 survey report noted a glass diversion rate of 19% (NAPP, 1988 survey). In its 1990 survey, NAPP indicated a high reuse rate of glass containers (approximately 60%). This reuse is assumed to be largely refillable beer and soft drink containers which would not appear in the waste generation estimates of this study. The NAPP report also showed a national recycling rate of approximately 15% to 20% of glass not reused. For Ontario, a 22% to 27% recycling rate of glass containers is indicated (NAPP, 1990 Survey).

  At this time reliable information on recycling of other types of glass materials in the IC&I sector, such as plate glass, is not available.

  Therefore, an initial estimate of 18%, representing approximately 14,700 tonnes of glass has been assumed to have been diverted in GTA in 1992.

- **Plastic**: Plastics currently have very limited markets for a number of reasons, including identification and sorting problems, contamination by materials other than plastic resins, and high transportation costs due to the low density of plastics.

The majority of film plastics are landfilled (Horn, 1993, Rafferty, 1993). Recycling of HDPE is usually profitable, but is not profitable at this time due to low market demand (Riddell, 1993).

PET has a significantly higher value than other plastics and is generally sorted from mixed plastics streams. However, PET generally is not used in high volumes in the IC&I sector. It likely would be collected under mixed material programs particularly from institutions such as hospitals and schools.

High volume, homogeneous, pre-consumer scrap plastics are assumed to have been recycled for some time and therefore are a smaller part of the waste generation estimates in this study.

NAPP, in its 1988 survey report, noted a plastics recycling rate of 7%. In the 1990 survey, NAPP indicates an overall plastics recycling rate of approximately 8% to 10%. In Ontario, reported plastics recycling varies from 1% to approximately 50%, depending on the packaging group. 1992 NAPP survey results indicate an overall plastics recycling rate (packaging groups 21 to 27) of approximately 15% (data supplied by Environment Canada, 1994).

Therefore, for this analysis, it is assumed that overall plastic recycling rates (including plastic packaging and other plastic waste) currently are low in the IC&I sector, and initial estimates of recycle rates for plastics have been made based on the following assumptions:

— PET	10%
— HDPE	10%
— Other plastics	3%

- **Metals**:

Ferrous: It is assumed that high volume homogeneous scrap metals have been recycled for some time and do not appear in significant portions in the waste generation estimates of this study. Tinplate steel recycling also is a well-established practice. However, the Canadian Steel Can Recycling Council (Paulowich, 1993) reported that available tonnages in the province are unknown, and so recycling rates of tinplate steel are uncertain. It is estimated though that in Ontario, the steel can recycling rate is approximately 70%.

NAPP reports that recycling of ferrous metal packaging varied between 19% and 70%, depending on the packaging group. Overall, a recycling rate of about 30% and a reuse rate of roughly 20% is indicated (NAPP, 1990 survey).

NAPP also indicates a disposal rate for ferrous metal packaging of 279,000 tonnes in Ontario for ferrous metal from packaging group 78 (strapping/wire), which represents a significant portion of the 444,000 tonnes of ferrous metals packaging reported used (NAPP, 1988 survey). In the same survey, a 19% diversion rate is indicated for ferrous metals. It is assumed that other containers such as paint cans which are heavy gauge, may constitute a significant portion of the waste stream that is not recycled.

Information on recycling of other metal goods is limited. Studies indicate that post consumer goods represent significant portions of the waste stream (Proctor & Redfern, SENES, 1991, Gore & Storrie, 1991).

An initial estimate of 20%, representing approximately 37,000 tonnes of ferrous metals, has been assumed to have been diverted in GTA in 1992.

Non-ferrous: NAPP indicates a 20% to 25% recycling rate in Canada for aluminum containers. In Ontario a 30% recycling rate is indicated (NAPP, 1990 survey). Container which have historically been recycled would not appear in the waste generation figures in this analysis. Also, high volume non-ferrous scrap metals have been recycled for some time due to their high value, and similarly would not be represented in the waste generation estimates.

It was assumed that non-ferrous materials in durable goods may be a significant portion of the waste stream for certain sectors and are assumed to have a relatively low diversion rate.

An initial estimate of 20%, representing approximately 23,000 tonnes of non-ferrous metal was assumed to have been recycled in 1992.

- **Wood**: Most IC&I wood wastes are generated in the manufacturing and wholesale sectors. A significant portion of this was assumed to be wooden pallets, particularly in the wholesale sector. Increasingly these are reused and recycled. NAPP indicates a wood packaging recycling rate in Ontario of from 12% to 41% depending on the packaging group (40% for pallets, etc.), and a combined reuse and recycling rate overall in Canada of roughly 85% (NAPP, 1990 survey). Data from the 1992 survey indicate an overall diversion rate of approximately 55%, mostly reuse with a relatively low rate of recycling (data supplied by Environment Canada, 1994). Landfill bans on disposal of wood are expected to have had a significant impact on the diversion of wood waste by all sectors through reuse and recycling.

  Therefore, an initial estimate of 30%, representing roughly 53,000 tonnes of wood was assumed to have been recycled in GTA in 1992.

- **Organics**: Despite specific examples of food waste diversion in the IC&I sector from surveys, overall food waste recycling rates in the IC&I sector were assumed to be low. While there is significant potential for food and yard waste diversion, markets, handling and processing capacity are not highly developed in GTA.

  An initial estimate of 1% diversion of food waste has been assumed. This may be low as a number of large grocery stores and large restaurants have established food waste recycling programs. At this time reliable information on the proportion of the food waste stream that this represents is limited.

  Similarly, yard waste diversion has been estimated at 1% (this may be low given some municipal works programs and facilities for centralized yard waste processing).

- **C&D**: Landfill bans have encouraged diversion of homogeneous wastes generated by the C&D sector; each of the GTA regions have imposed landfill disposal bans on recyclable wood, recyclable drywall, cardboard, metals, concrete and rubble. As such, source separation of banned materials takes place at a number of construction sites. Over the years, C&D companies have achieved significant diversion of the quantity of waste going to landfill. For example, one major construction company has achieved a 50% diversion of waste going to landfill through source separation and on-site reuse applications (confidential source).

MacViro estimated diversion of up to 48% of C&D wastes in a scenario of good economic activity in GTA and reduced export of wastes (this does not consider material historically diverted). This diversion estimate assumed that of the new diversion, 19% would be concrete, metals and other heavy materials, 53% would be clean drywall, OCC and wood, and 28% would be other mixed materials (MacViro, 1992).

For this analysis, initial estimates of C&D recycling were as follows:

- Brick 30% - may be low considering bans
- OCC 60% - readily separated and recycled, good markets
- Concrete 30% - may be low considering landfill bans
- Drywall 30% - may be low (MacViro reports drywall processing of 35,000 tonnes in 1992)
- Steel 60% - readily separated and recycled, good markets
- Wood 60% - readily separated and recycled, good markets
- Other 5% - may be low

Overall, diversion of 37%, representing an estimated 223,000 tonnes of C&D material, has been assumed. This may be low, particularly for the aggregates, given landfill bans and processing capacity for some materials such as gypsum.

- **Other Materials**: This includes tires, textiles, bulky goods and other materials. It is difficult to estimate diversion of these materials because there is no accurate breakdown of the composition of this category. An initial estimate of 10% diversion of other materials is assumed.

From this approach it was estimated that overall, approximately 28.3%, or 791,000 tonnes of IC&I wastes could have been diverted in GTA in 1992. Total IC&I waste generation in 1992 is estimated at approximately 2.796 million tonnes, therefore, an estimated 2 million tonnes were disposed. Sensitivity analyses on some of these assumptions indicate that a lower bound to this estimate is approximately 25% diversion, or approximately 700,000 tonnes in 1992.

12.4 Estimates of Waste Diversion by the IC&I System 2 – Existing/Committed

12.4.1 Approach to Waste Diversion Estimate

The Existing/Committed System includes the impacts of the Provincial 3Rs Regulations, and also the impacts of NAPP. The Ontario 3Rs Regulations were promulgated in March, 1994. Preliminary estimates of their potential impact on diversion of IC&I waste in Greater Toronto Area were developed using 1992 waste generation values, for illustrative purposes.

The 3Rs Regulations apply to designated major generators as discussed in Section 12.2. Therefore small (non-major) IC&I generators will not be required to source separate materials in the foreseeable future.

At this time, the proportion of total IC&I waste in the Greater Toronto Area generated by "major" IC&I generators subject to the 3Rs Regulations is not known. The Study Team attempted to obtain detailed information such as profiles of employment, retail space, office space, construction and demolition projects from many sources in order to refine this analysis. A summary of the contacts made is presented in Schedule O. The data obtained did not provide adequate detail with which to estimate the number of generators impacted by the 3Rs Regulations. MOEE staff estimate that there are approximately 70,000 IC&I generators in

Ontario, and that approximately 10% of these (7,000 generators) will be subject to the 3Rs Regulations. An estimate of the number of generators subject to a 1992 draft of the 3Rs Regulations is provided below:

Businesses/Organizations Classified as IC&I Waste Generators

IC&I Sectors	Size Criteria	Large Generators	Total Generators
Shopping complexes	10,000 m^2	400	1,533
Construction/demolition firms	50 employees	625	25,176
Office buildings	10,000 m^2	266	1,579
Food services	$5 million sales	1,468	16,136
Hotel/motels	75 rooms	244	2,544
Hospitals	100 beds	373	1,881
Schools	350 students	1,006	5,431
Manufacturers	100 employees	2,006	15,109
Total		**6,388**	**69,389**

Preliminary estimates of the impact of the 3Rs Regulations and NAPP on IC&I sector waste generators considered what quantities of waste would be diverted if all IC&I waste generators were subject to these Regulations. Assumptions were then made on the proportion of the IC&I stream likely to be subject to the Regulations.

One of the limitations of this analysis is determining the "overlap" between companies which are currently recycling on a voluntary basis, and those which are designated as major generators and which will be required to conduct waste audits and develop waste reduction plans under the 3Rs Regulations. If all of those required to implement source separation programs currently are doing so, then the incremental effects of the 3Rs Regulations would be zero, and waste diversion would remain at the current level, estimated to be approximately 28.3%. This is unlikely to be the case. However, to determine the exact number of companies which are subject to the 3Rs Regulations, and the percentage of these which are currently meeting all of the requirements of the Regulations is not possible without extensive research and survey activity.

In the absence of reliable information on the number of establishments and the proportion of the total IC&I waste stream covered by the Regulations (3Rs and NAPP) and detailed data on current levels of recycling, a "coverage" factor was applied to the waste materials potentially diverted if all establishments were subject to the Regulations. "Coverage" factors of 40% and 60% were applied to these estimates to include waste streams covered by the Regulations and those that voluntarily divert materials from disposal.

After determining the amount of each targetted material covered by the 3Rs Regulations and NAPP and potentially recycled voluntarily, capture rates were applied to estimate the amount of these materials actually recovered. These rates are applied to account for contamination, identification problems, handling difficulties, other reasons for rejection and non-compliance with the Regulations. Table 12.4 presents the capture rates applied to estimate recovery of each material.

In addition, estimates of voluntary diversion of materials which are targetted by the 3Rs Regulations but which are generated in sectors not subject to the Regulations were made by applying the assumed existing diversion rates for these materials. Also, estimates of voluntary diversion of potentially recyclable materials which are not targetted by the 3Rs Regulations were made by applying the assumed existing diversion rates for these materials.

Table 12.4
Coverage and Capture Rates
Assumed for Existing/Committed IC&I System Diversion Estimates

Material	Coverage Rates			Capture Rates	
	Existing/ Committed	Extended and Expanded 3Rs Systems	No Unprocessed Waste To Landfill	Source Separation	Mixed Waste Handling
OCC	40%/60%	90%	100%	85%	50%
ONP	40%/60%	90%	100%	85%	50%
Fine Paper	40%/60%	90%	100%	85%	50%
Mixed Paper	40%/60%	90%	100%	85%	50%
Glass	40%/60%	90%	100%	65%	25%
Ferrous Metal	40%/60%	90%	100%	75%	50%
Non-ferrous Metal	40%/60%	90%	100%	75%	50%
HDPE	40%/60%	90%	100%	75%	50%
PET	40%/60%	90%	100%	75%	50%
Other Plastics	40%/60%	90%	100%	65%	35%
Food	40%/60%	90%	100%	85%	50%
Yard	40%/60%	90%	100%	85%	50%
Wood	40%/60%	90%	100%	75%	50%
Other	40%/60%	90%	100%	65%	5%
C&D (targeted)	40%/60%	90%	100%	85%	50%
C&D (other)	40%/60%	90%	100%	65%	5%

Notes

1. Factors for coverage and capture are applied to estimates of the amount of each material potentially included if all establishments were subject to regulations or participated in diversion activities.
2. For System 6, No Unprocessed Waste to Landfill, material not source separated in the Existing/Committed System is handled as a mixed waste stream

12.4.2 Assumptions for Diversion Estimates for IC&I System 2 – Existing/Committed

The IC&I waste generation and composition and the amount of each material potentially subject to the 3Rs Regulations are shown by sector for each Region and for the entire GTA in Schedule N. The following assumptions were used to develop these estimates:

- **Composition**
  For each sector the proportion of each material category (e.g. mixed paper, glass, ferrous metal) which is targeted by the Regulations (e.g. fine paper, glass food and beverage containers - refer to Section 12.2) was estimated based on waste composition data from studies conducted in Ontario (Gore and Storrie, 1991 and Proctor & Redfern and SENES, 1991).

- **Primary**
  The primary sector is not generally subject to the Regulations. However, mining and petrochemical industries in Metro likely would involve office activity which might be subject to the Regulations (depending on the floor area of the office building). All OCC, ONP, fine paper, glass, metal and aluminum food and beverage containers from these establishments were included in the estimates.

- **Manufacturing**
  All OCC, ONP, fine paper, glass, ferrous metal, non-ferrous metal, specified plastics (PET, HDPE, LDPE and LLDPE, polystyrene foam, trays, reels and spools) wood and fine paper generated by the manufacturing sector are potentially subject to the 3Rs Regulations.

  The packaging audits required under the 3Rs Regulations would apply to major generators in SIC 10, 11, 27 and 37. Also, NAPP applies to most significant packaging generators. Therefore, it was assumed that 75% of remaining mixed paper waste from the manufacturing sector would be potentially diverted over time as a result of packaging and waste audits.

- **Transport/Communication/Utilities**
  This sector includes truck, rail and shipping transport, as well as communications and utilities. Some activities have similar characteristics to the manufacturing sector, while others are office-related facilities. The material-specific assumptions for the office and manufacturing sectors have been applied to the respective portion of the waste stream.

- **Wholesale**
  The wholesale sector is not subject to the source separation provisions of the 3Rs Regulations. However, the packaging audits required under the 3Rs Regulations would apply to importers of food, beverage, paper and chemical products with sales greater than $20 million/year. Also, NAPP applies to most significant packaging generators. It was assumed that for the materials used in packaging, 50% of the waste generated in the wholesale sector potentially would be diverted over time under the NAPP initiative (NAPP specifically is directed toward "brand owners", defined as manufacturers, distributors or importers of products and therefore includes the wholesale sector).

- **Retail**
  All OCC, ONP, fine paper, glass, metal and aluminum food and beverage containers were assumed to be potentially subject to mandatory source separation.

- **Financial/Insurance/Real Estate**
  All activity in this sector was considered to be office activity. Therefore, all OCC, ONP, fine paper, glass, metal and aluminum food and beverage containers were assumed to be potentially subject to the Regulations.

- **Non-Commercial (Education and Health/Social)**
  This sector includes schools and hospitals, both of which are included in the 3Rs Regulations. Therefore, all OCC, ONP, fine paper, glass, metal and aluminum food and beverage containers were assumed to be potentially subject to the 3Rs Regulations.

- **Commercial**
  The commercial services sector is made up of a variety of activities, mostly categorized as offices or restaurants. All of these were considered potentially subject to the Regulations. Therefore, all OCC, ONP, fine paper, glass, metal and aluminum food and beverage containers were assumed to be potentially subject to mandatory source separation. PET for the food/beverage and accommodation groups also was assumed to be potentially subject to source separation.

- **Public Administration**
  This sector involves primarily government administration services which for the most part, were assumed to be office activities. Therefore, all OCC, ONP, fine paper, glass and metal food and beverage containers were assumed to be potentially subject to the Regulations.

- **Construction and Demolition**
  Estimates of C&D waste generation and composition are described in Chapter 11 and presented in Table 11.9.

- **Other Assumptions**
  It was assumed that 50% of PET and HDPE from all sectors potentially could be diverted over time as a result of waste audits as these materials command good market prices when clean, and there appears to be a demand (over the longer term). The HDPE market currently is soft, but is assumed to improve in the future.

  Finally, it was assumed that 20% of "other" waste material could be diverted over time. "Other" material refers to undefined waste in the composition analysis. It includes textiles, durable goods, non-specific industrial wastes and other materials not specified in the list of materials presented in this analysis. Also, some materials that have been specified in this analysis such as OCC, etc. are likely included.

12.4.3 Range of Diversion Estimates for IC&I System 2 – Existing/Committed

As described in Section 12.4.1, factors of 40% and 60% were applied to represent different coverage levels of the 3Rs Regulations and NAPP. Tables 12.5 and 12.6 summarize the estimates of diversion rates at each of the assumed levels of "coverage". Estimates of the actual capture rates for each material assuming the respective coverage factor and all voluntary recycling are shown in column 3 of the Tables.

For some materials the net impact of the 3Rs Regulations and NAPP is estimated to be zero, that is, current voluntary recycling of a material is greater than the amount estimated to be diverted at the assumed coverage levels and capture rates.

Table 12.5
Estimate of Diversion of IC&I Waste
Under Existing/Committed IC&I System (40% coverage)
Greater Toronto Area

Waste Component	Estimated IC&I Waste Generated (tonnes) 1992 (column 1)	Estimated IC&I Diversion Existing 3R (tonnes)	Estimated Diversion Existing/Committed System 40% Coverage (column 3) (tonnes)	Estimated IC&I Diversion Rate By Material (%)	Estimated IC&I Waste Disposed (by difference) (tonnes)	Estimated Composition of Disposed IC&I Waste (%)
Total IC&I Waste (tonnes)	2,796,381					
Paper						
Newspaper	97,036	33,963	33,963	35.0%	63,074	3%
Corrugated cardboard (OCC)	330,721	198,433	198,433	60.0%	132,288	7%
Fine Paper		70,240			0	
Mixed paper (1)	557,463	115,952	186,192	33.4%	371,270	19%
Subtotal (Paper)	985,220	418,588	418,588	42.5%	566,632	29%
Glass	81,735	14,712	19,294	23.6%	62,441	3%
Ferrous	185,018	37,004	48,682	26.3%	136,335	7%
Non-ferrous	115,529	23,106	31,387	27.2%	84,142	4%
Subtotal (Metal)	300,546	60,109	80,069	26.6%	220,477	11%
Plastic						
PET	5,053	505	1,062	21.0%	3,991	0%
HDPE	36,301	3,630	7,481	20.6%	28,821	1%
Other Plastic	190,302	5,709	14,813	7.8%	175,489	9%
Subtotal (Plastic)	231,656	9,845	23,356	10.1%	208,301	11%
Organics						
Food wastes	211,954	2,120	2,120	1.0%	209,835	11%
Yard waste	31,233	312	312	1.0%	30,920	2%
Subtotal (Organics)	243,187	2,432	2,432	1.0%	240,755	12%
Wood Waste	176,838	53,051	61,563	34.8%	115,275	6%
Construction/Demolition Waste						
Brick,OCC,Conc,Drywl,Steel,Wood	387,574	212,761	212,761	54.9%	174,813	9%
Other	207,595	10,380	10,380	5.0%	197,215	10%
Subtotal (C&D)	595,169	223,141	223,141	37.5%	372,028	19%
Other	182,030	9,101	9,466	5.2%	172,564	9%
TOTAL	**2,796,381**	**790,979**	**837,908**	**30.0%**	**1,958,473**	**100%**

Notes:
1. Includes some fine paper of some sectors
2. Column 3 shows estimated diversion due to the 3Rs regulations and voluntary initiatives

Table 12.6
Estimate of Diversion of IC&I Waste
Under Existing/Committed IC&I System (60% coverage)
Greater Toronto Area

Waste Component	Estimated IC&I Waste Generated (tonnes) 1992 (column 1)	Estimated IC&I Diversion Existing 3R (tonnes)	Estimated Diversion Existing/Committed System 60% Coverage (tonnes) (column 3)	Estimated IC&I Diversion Rate By Material (%)	Estimated IC&I Waste Disposed (by difference) (tonnes)	Estimated Composition of Disposed IC&I Waste (%)
Total IC&I Waste (tonnes)	2,796,381					
Paper						
Newspaper	97,036	33,963	48,557	50.0%	48,480	3%
Corrugated cardboard (OCC)	330,721	198,433	198,433	60.0%	132,288	7%
Fine Paper		70,240			0	
Mixed paper (1)	557,463	115,952	200,149	35.9%	357,313	19%
Subtotal (Paper)	985,220	418,588	447,138	45.4%	538,082	29%
Glass	81,735	14,712	28,694	35.1%	53,041	3%
Ferrous	185,018	37,004	66,201	35.8%	118,817	6%
Non-ferrous	115,529	23,106	43,808	37.9%	71,720	4%
Subtotal (Metal)	300,546	60,109	110,009	36.6%	190,537	10%
Plastic						
PET	5,053	505	1,479	29.3%	3,574	0%
HDPE	36,301	3,630	10,369	28.6%	25,933	1%
Other Plastic	190,302	5,709	21,060	11.1%	169,242	9%
Subtotal (Plastic)	231,656	9,845	32,908	14.2%	198,748	11%
Organics						
Food wastes	211,954	2,120	2,120	1.0%	209,835	11%
Yard waste	31,233	312	312	1.0%	30,920	2%
Subtotal (Organics)	243,187	2,432	2,432	1.0%	240,755	13%
Wood Waste	176,838	53,051	81,705	46.2%	95,133	5%
Construction/Demolition Waste						
Brick,OCC,Conc,Drywl,Steel,Wood	387,574	212,761	212,761	54.9%	174,813	9%
Other	207,595	10,380	10,380	5.0%	197,215	11%
Subtotal (C&D)	595,169	223,141	223,141	37.5%	372,028	20%
Other	182,030	9,101	14,198	7.8%	167,831	9%
TOTAL	**2,796,381**	**790,979**	**940,226**	**33.6%**	**1,856,156**	**100%**

Notes:
1. Includes some fine paper of some sectors
2. All diversion estimates illustrated using assumed 1992 data.
3. Column 3 shows estimated diversion due to the 3Rs regulations and voluntary initiatives

In summary, it appears that between 30% and 34% of IC&I waste could potentially be diverted under the Existing/Committed system. This diversion would be achievable by the year 2000, assuming that the system is fully mature by that time. These estimates do not include a source reduction allowance, which is estimated separately, as described in Section 12.9.

12.5 Estimates of Waste Diversion by the IC&I System 3 – Extended 3Rs Regulations

Under System 3, extended 3Rs Regulations would be designed to target generators of 90% of the IC&I waste stream. Establishments which generate 90% of the waste stream in all sectors would be required to source separate the following materials:

- OCC
- ONP
- fine paper
- glass food and beverage containers
- steel and aluminum food and beverage containers.

Mandatory source separation of a longer list of materials, currently only targeted from major generators within the manufacturing sector, would be extended in System 3 to apply to the generators in the manufacturing sector who are responsible for generation of 90% of the manufacturing waste stream. In addition to the above materials, the manufacturing sector would also be required to source separate the following materials:

- plastics - PET, HDPE, LLDPE and LDPE, polystyrene film, spools etc., and
- wood.

The Regulations would be extended so that generators of 90% of the C&D waste stream were covered. Materials targeted include:

- brick
- OCC
- concrete
- drywall,
- steel and
- wood.

IC&I waste generation and composition estimates and the amount of each material potentially subject to the Extended 3Rs Regulations and NAPP are shown by sector for each Region and for the entire GTA in Schedule N. The assumptions used to develop these estimates were similar to those described in Section 12.4.2 except that all sectors were included. A factor of 90% was applied to these estimates to determine the amount of waste generated by establishments covered by the Extended 3Rs Regulations and NAPP.

After determining the amount of each material covered by the Regulations, capture rates were applied to estimate the amount of material which is likely to be recovered. These rates are applied to account for contamination, identification problems, handling difficulties, other reasons for rejection and non-compliance with the Regulations. Table 12.4 presents the capture rates applied to estimate recovery of each material.

Estimates of voluntary diversion of potentially recyclable materials which are not targetted by the Extended 3Rs Regulations have been made by applying the assumed existing diversion rates for these materials.

Table 12.7 presents diversion estimates for the Extended 3Rs Regulations System. As with System 2, column 3 of the Table shows the actual capture rates for each material due to the Extended 3Rs Regulations and any voluntary recycling. It was estimated that approximately 46% of IC&I waste material could be diverted under System 3. This diversion would be achievable by the year 2000, assuming that the system is fully mature by that time. These estimates do not include a source reduction allowance, which is estimated separately, as described in Section 12.9.

12.6 Estimates of Waste Diversion by the IC&I System 4 – Expanded 3Rs Regulations

The Expanded 3Rs Regulations System (System 4) is built on System 3 (Extended 3Rs Regulations) and requires source separation and diversion of a larger number of dry materials by all sectors. Mandatory separation of all HDPE, PET plastics (LLDPE and LDPE, polystyrene film, spools etc.) and wood is extended to all sectors in this system, whereas these materials were required to be source separated by only the manufacturing sector under System 3. Also, mixed paper (in addition to fine paper) from all sectors is targetted and would be subject to mandatory source separation. It would likely be collected as a mixed paper stream and after processing, a portion of it would be marketed as lower grade fibre.

A similar method to that used for analysis of System 3 was used to estimate the potential diversion of this System 4.

IC&I waste generation and composition estimates and the amount of each material potentially subject to the Expanded 3Rs Regulations and NAPP are shown by sector for the entire GTA in Schedule N. A factor of 90% was applied to these estimates to determine the amount of waste generated by establishments covered by the Expanded 3Rs Regulations and NAPP. After determining the amount of each material covered by the Regulations, capture rates were applied to estimate the amount of material likely to be recovered. These rates are applied to account for contamination, identification problems, handling difficulties, other reasons for rejection and non-compliance with the Regulations. Table 12.4 presents the capture rates applied to estimate recovery of each material.

Table 12.8 presents diversion estimates for the Expanded 3Rs Regulations System. As with System 2 and 3, column 3 of the Table shows the actual capture rates for each material due to the Expanded 3Rs Regulations. It was estimated that approximately 54% of IC&I waste material could be diverted under System 4. This diversion would be achievable by the year 2000, assuming that the system is fully mature by that time. These estimates do not include a source reduction allowance, which is estimated separately, as described in Section 12.9.

12.7 Estimates of Waste Diversion by the IC&I System 5 – Expanded 3Rs Regulations with Organics

In the IC&I System 5 – Expanded 3Rs Regulations with Organics, wet organics (food and yard waste), which constitute an estimated 8.7% of IC&I sector wastes, were included in the list of materials targetted for source separation. Generators targetted for mandatory separation requirements would be those that contribute to 90% of all wet organic waste generated. This system is built on Systems 3 and 4 and a similar method was used to estimate the potential diversion.

Table 12.7
Estimate of Diversion of IC&I Waste
Under IC&I System 3 – Extended 3Rs Regulations
Greater Toronto Area

Waste Component	Estimated IC&I Waste Generated (tonnes) 1992 (column 1)	Estimated IC&I Diversion Existing 3Rs (tonnes)	Estimated Diversion Extended 3Rs System (tonnes) (column 3)	Estimated IC&I Diversion Rate By Material (%)	Estimated IC&I Waste Disposed (by difference) (tonnes)	Estimated Composition of Disposed IC&I Waste (%)
Total IC&I Waste (tonnes)	2,796,381					
Paper						
Newspaper	97,036	33,963	74,233	76.5%	22,804	2%
Corrugated cardboard (OCC)	330,721	198,433	253,001	76.5%	77,719	5%
Fine Paper		70,240			0	
Mixed paper (1)	557,463	115,952	255,907	45.9%	301,556	20%
Subtotal (Paper)	985,220	418,588	583,141	59.2%	402,079	26%
Glass	81,735	14,712	45,107	55.2%	36,628	2%
Ferrous	185,018	37,004	93,955	50.8%	91,062	6%
Non-ferrous	115,529	23,106	64,917	56.2%	50,612	3%
Subtotal (Metal)	300,546	60,109	158,872	52.9%	141,674	9%
Plastic						
PET	5,053	505	2,105	41.7%	2,948	0%
HDPE	36,301	3,630	14,701	40.5%	21,601	1%
Other Plastic	190,302	5,709	30,431	16.0%	159,871	11%
Subtotal (Plastic)	231,656	9,845	47,236	20.4%	184,420	12%
Organics						
Food wastes	211,954	2,120	2,120	1.0%	209,835	14%
Yard waste	31,233	312	312	1.0%	30,920	2%
Subtotal (Organics)	243,187	2,432	2,432	1.0%	240,755	16%
Wood Waste	176,838	53,051	111,918	63.3%	64,920	4%
Construction/Demolition Waste						
Brick,OCC,Conc,Drywl,Steel,Wood	387,574	212,761	296,494	76.5%	91,080	6%
Other	207,595	10,380	10,380	5.0%	197,215	13%
Subtotal (C&D)	595,169	223,141	306,874	51.6%	288,295	19%
Other	182,030	9,101	21,297	11.7%	160,732	11%
TOTAL	**2,796,381**	**790,979**	**1,276,878**	**45.7%**	**1,519,503**	**100%**

Notes:
1. Includes some fine paper of some sectors
2. All diversion estimates illustrated using assumed 1992 data.
3. Column 3 shows estimated diversion due to the Extended 3Rs Regulations and voluntary initiatives

Table 12.8
Estimate of Diversion of IC&I Waste
Under IC&I System 4 – Expanded 3Rs Regulations
Greater Toronto Area

Waste Component	Estimated IC&I Waste Generated (tonnes) 1992 (column 1)	Estimated IC&I Diversion Existing 3Rs (tonnes)	Estimated Diversion Expanded 3Rs System (tonnes) (column 3)	Estimated IC&I Diversion Rate By Material (%)	Estimated IC&I Waste Disposed (by difference) (tonnes)	Estimated Composition of Disposed IC&I Waste (%)
Total IC&I Waste (tonnes)	2,796,381					
Paper						
Newspaper	97,036	33,963	74,233	76.5%	22,804	2%
Corrugated cardboard (OCC)	330,721	198,433	253,001	76.5%	77,719	6%
Fine Paper		70,240			0	
Mixed paper (1)	557,463	115,952	380,589	68.3%	176,873	14%
Subtotal (Paper)	985,220	418,588	707,824	71.8%	277,396	22%
Glass	81,735	14,712	47,815	58.5%	33,920	3%
Ferrous	185,018	37,004	124,887	67.5%	60,131	5%
Non-ferrous	115,529	23,106	77,982	67.5%	37,547	3%
Subtotal (Metal)	300,546	60,109	202,869	67.5%	97,678	8%
Plastic						
PET	5,053	505	3,411	67.5%	1,642	0%
HDPE	36,301	3,630	24,503	67.5%	11,798	1%
Other Plastic	190,302	5,709	73,345	38.5%	116,957	9%
Subtotal (Plastic)	231,656	9,845	101,260	43.7%	130,397	10%
Organics						
Food wastes	211,954	2,120	2,120	1.0%	209,835	16%
Yard waste	31,233	312	312	1.0%	30,920	2%
Subtotal (Organics)	243,187	2,432	2,432	1.0%	240,755	19%
Wood Waste	176,838	53,051	119,366	67.5%	57,472	4%
Construction/Demolition Waste						
Brick,OCC,Conc,Drywl,Steel,Wood	387,574	212,761	296,494	76.5%	91,080	7%
Other	207,595	10,380	10,380	5.0%	197,215	15%
Subtotal (C&D)	595,169	223,141	306,874	51.6%	288,295	22%
Other	182,030	9,101	21,297	11.7%	160,732	12%
TOTAL	**2,796,381**	**790,979**	**1,509,736**	**54.0%**	**1,286,646**	**100%**

Notes:
1. Includes some fine paper of some sectors
2. All diversion estimates illustrated using assumed 1992 data.
3. Column 3 shows estimated diversion due to the Expanded 3Rs Regulations

Food waste processors, food terminals, grocery stores, restaurants, hotels, hospitals and schools are the largest generators of food waste in the IC&I sector. Since they are the most significant food waste generators, and since it was assumed that they would most easily be able to institute source separation of food wastes, these sectors would likely be targetted specifically - that is, SIC 10 and 11 in the manufacturing sector, SIC 60 and 65 in the retail sector, SIC 85 and 86 in the non-commercial services sector, and SIC 91, 92 and 96 in the commercial service sector. In all, these represent approximately 75% of food waste generation. Therefore, in order to achieve 90% diversion of food and yard wastes, additional sectors would be targetted.

IC&I waste generation and composition estimates and the amount of each material potentially subject to the Expanded 3Rs with Organics Regulations and NAPP are shown by sector for the entire GTA in Schedule N. A factor of 90% was applied to these estimates to determine the amount of waste covered by the Regulations. After determining the amount of each material covered by the Regulations, capture rates were applied to estimate the amount of material actually recovered. These rates are applied to account for contamination, handling difficulties, other reasons for rejection and non-compliance with the Regulations. Table 12.4 presents the capture rates applied to estimate recovery of each material.

Table 12.9 presents diversion estimates for the IC&I System 5 – Expanded 3Rs Regulations with Organics. As with System 3, column 3 of the Table shows the actual capture rates for each material due to the Expanded 3Rs with Organics Regulations. It was estimated that approximately 60% of IC&I waste material could be diverted under System 5. This diversion would be achievable by the year 2000, assuming that the system is fully mature by that time. These estimates do not include a source reduction allowance, which is estimated separately, as described in Section 12.9.

12.8 Estimates of Waste Diversion by IC&I System 6 – No Unprocessed IC&I Waste to Landfill

This system is built on System 2, Existing/Committed. As presented in the description of this system in Section 12.2, it has been assumed that the requirements of this system would be met in a number of ways. These would include greater source separation of some materials, and processing of mixed waste streams (likely from smaller generators) in a mixed waste processing facility. This assumption was based on current practice in GTA as well as experience in other jurisdictions (e.g. Minneapolis/St.Paul) (Rafferty, 1993).

For the purposes of this analysis, it was assumed that the waste mandated for source separation in the Existing/Committed System would continue to be source separated and diverted from landfill. The 60% coverage case for System 2 has been used as the basis for diversion estimates of source separated waste in System 6. The estimates of the potential diversion achievable by the Existing/Committed System are summarized in Section 12.4 and shown in Table 12.6 for the 60% coverage case.

It was assumed that all of the waste materials estimated to be disposed in the Existing/Committed System would be processed to recover recyclable/reusable materials prior to being disposed in landfills. Also, it was assumed that all of this material would be handled as mixed waste streams. This represents 66% of the total IC&I waste stream for the 60% coverage case. Therefore, building on System 2, the material assumed to undergo some further processing is shown in column 4 of Table 12.10.

It was also assumed that under such a system, while more of the IC&I waste potentially would be handled, there would be a portion of the waste for which it would be unviable to recover material for diversion due to contamination, deterioration, limited reprocessing technology, etc. To account for this, recovery factors were applied to all of the material assumed to be available and collected for processing, after some source separation had occurred.

Table 12.9
Estimate of Diversion of IC&I Waste
Under IC&I System 5 – Expanded 3Rs Regulations with Organics
Greater Toronto Area

Waste Component	Estimated IC&I Waste Generated (tonnes) 1992 (column 1)	Estimated IC&I Diversion Existing 3Rs (tonnes)	Estimated Diversion Expanded 3Rs Plus Organics System (tonnes) (column 3)	Estimated IC&I Diversion Rate By Material (%)	Estimated IC&I Waste Disposed (by difference) (tonnes)	Estimated Composition of Disposed IC&I Waste (%)
Total IC&I Waste (tonnes)	2,796,381					
Paper						
Newspaper	97,036	33,963	74,233	76.5%	22,804	2%
Corrugated cardboard (OCC)	330,721	198,433	253,001	76.5%	77,719	7%
Fine Paper		70,240			0	
Mixed paper (1)	557,463	115,952	380,589	68.3%	176,873	16%
Subtotal (Paper)	985,220	418,588	707,824	71.8%	277,396	25%
Glass	81,735	14,712	47,815	58.5%	33,920	3%
Ferrous	185,018	37,004	124,887	67.5%	60,131	5%
Non-ferrous	115,529	23,106	77,982	67.5%	37,547	3%
Subtotal (Metal)	300,546	60,109	202,869	67.5%	97,678	9%
Plastic						
PET	5,053	505	3,411	67.5%	1,642	0%
HDPE	36,301	3,630	24,503	67.5%	11,798	1%
Other Plastic	190,302	5,709	73,345	38.5%	116,957	11%
Subtotal (Plastic)	231,656	9,845	101,260	43.7%	130,397	12%
Organics						
Food wastes	211,954	2,120	159,179	75.1%	52,776	5%
Yard waste	31,233	312	23,708	75.9%	7,524	1%
Subtotal (Organics)	243,187	2,432	182,887	75.2%	60,300	5%
Wood Waste	176,838	53,051	119,366	67.5%	57,472	5%
Construction/Demolition Waste						
Brick,OCC,Conc,Drywl,Steel,Wood	387,574	212,761	296,494	76.5%	91,080	8%
Other	207,595	10,380	10,380	5.0%	197,215	18%
Subtotal (C&D)	595,169	223,141	306,874	51.6%	288,295	26%
Other	182,030	9,101	21,297	11.7%	160,732	15%
TOTAL	**2,796,381**	**790,979**	**1,690,191**	**60.4%**	**1,106,190**	**100%**

Notes:
1. Includes some fine paper of some sectors
2. All diversion estimates illustrated using assumed 1992 data
3. Column 3 shows estimated diversion due to the Expanded 3Rs with Organics Regulations

Table 12.10
Estimate of Diversion of IC&I Waste
IC&I System 6 –
No Unprocessed Waste to Landfill
Greater Toronto Area

Waste Component	Estimated IC&I Waste Generated (tonnes) 1992 (column 1)	Estimated IC&I Diversion Existing 3Rs (tonnes)	Estimated Diversion Exis./Comm. System 60% Capture (tonnes) (column 3)	Estimated IC&I Waste Disposed (by difference) (tonnes) (column 4)	Estimated Diversion No Unprocessed Waste to Landfill System (tonnes) (column 5)	Estimated IC&I Diversion Rate By Material (%)	Estimated IC&I Waste Disposed (by difference) (tonnes)	Estimated Composition of Disposed IC&I Waste (%)
Total IC&I Waste (tonnes)	2,796,381							
Paper								
Newspaper	97,036	33,963	48,557	48,480	72,797	75%	24,240	2%
Corrugated cardboard (OCC)	330,721	198,433	198,433	132,288	264,577	80%	66,144	6%
Fine Paper		70,240		0	0	0%	0	0%
Mixed paper (1)	557,463	115,952	200,149	357,313	378,806	68%	178,657	17%
Subtotal (Paper)	985,220	418,588	447,138	538,082	716,179	73%	269,041	25%
Glass	81,735	14,712	28,694	53,041	41,954	51%	39,781	4%
Ferrous	185,018	37,004	66,201	118,817	125,609	68%	59,408	6%
Non-ferrous	115,529	23,106	43,808	71,720	79,669	69%	35,860	3%
Subtotal (Metal)	300,546	60,109	110,009	190,537	205,278	68%	95,268	9%
Plastic								
PET	5,053	505	1,479	3,574	3,266	65%	1,787	0%
HDPE	36,301	3,630	10,369	25,933	23,335	64%	12,966	1%
Other Plastic	190,302	5,709	21,060	169,242	80,295	42%	110,007	10%
Subtotal (Plastic)	231,656	9,845	32,908	198,748	106,896	46%	124,760	12%
Organics								
Food wastes	211,954	2,120	2,120	209,835	159,496	75%	52,459	5%
Yard waste	31,233	312	312	30,920	23,503	75%	7,730	1%
Subtotal (Organics)	243,187	2,432	2,432	240,755	182,998	75%	60,189	6%
Wood Waste	176,838	53,051	81,705	95,133	129,271	73%	47,566	4%
Construction/Demolition Waste								
Brick,OCC,Conc,Drywl,Steel,Wood	387,574	212,761	212,761	174,813	300,168	77%	87,407	8%
Other	207,595	10,380	10,380	197,215	20,241	10%	187,354	17%
Subtotal (C&D)	595,169	223,141	223,141	372,028	320,408	54%	274,761	26%
Other	182,030	9,101	14,198	167,831	22,590	12%	159,440	15%
TOTAL	**2,796,381**	**790,979**	**940,226**	**1,856,156**	**1,725,575**	**62%**	**1,070,806**	**100%**

Notes:
1. Includes some fine paper of some sectors
2. All diversion estimates illustrated using assumed 1992 data.
3. Column 5 shows estimated diversion under No Unprocessed Waste to Landfill System.

The recovery factors applied to the quantities of mixed waste collected for processing and recovery are shown in Table 12.4.

The estimated diversion potentially achieved by System 6 is summarized in Table 12.10. Column 5 shows total diversion potentially achieved for all materials.

System 6 is estimated to divert approximately 62% of the IC&I waste stream. This is similar to diversion achieved by System 5, even though a different approach is used. This diversion would be achievable by the year 2000, assuming that the system is fully mature by that time. These estimates do not include a source reduction allowance, which is estimated separately, as described in Section 12.9.

In System 5, high diversion is achieved because targetted materials are separated and segregated at source. They are relatively uncontaminated, and can be easily processed to meet market specifications.

In System 6, some source separation occurs, but most material is collected as a mixed waste stream with lower recovery potential.

12.9 Source Reduction by IC&I Generators

Projections of quantities of IC&I waste generated from the year 1996 to the year 2015 for each GTA Region and for the entire GTA are presented in Table 11.5 of Chapter 11 of this document. Subsequent to the development of these IC&I waste generation estimates, source reduction allowance was applied to these estimates to identify the potential quantities of waste which will not be generated by the IC&I sector in the future.

Source reduction of IC&I waste in the future is attributed to at least three major factors, which are:

- changes in the employment profile of each GTA Region;
- innovation by IC&I generators;
- innovation by the C&D sector.

The methods used to estimate source reduction as a result of these three factors are described below.

Source Reduction due to Changes in the employment Profile of each GTA Region: Future employment in each major IC&I sector in each Region was compared to current employment to determine if there was a major shift towards IC&I groups which have traditionally been lower waste generators. The IC&I per employee generation rates presented in Table 11.6 in Chapter 11 of this document were used to adjust future IC&I waste generation estimates. This was carried out by assuming that regional IC&I waste generation would continue at the rates experienced around 1987. Changes in generation as a result of employment shifts to different industries in each GTA Region are presented in Schedule O.

Source Reduction due to Innovation: The IC&I sector (excluding the construction and demolition sector which is addressed separately) is expected to reduce the generation of some wastes over the planning period through modernization, process change, increased operational efficiencies, etc. While it is generally accepted that this trend is occurring and will continue, because of global competition, etc., very little quantitative data are available on the impacts of this trend on future IC&I waste generation for the whole IC&I sector. Many case studies quote exceptional programs where significant reductions have been achieved (described in Schedule

O). However, these are high profile examples of innovative behaviour and cannot be applied to the total IC&I sector for waste generation estimates. A modest source reduction allowance of 0.5% per year in waste reduction, starting in 1993, and continuing to the year 2015 (when the reduction increment would be 11.5%) was used for this analysis.

Source Reduction in the C&D Sector: Construction and demolition waste was separated from other IC&I waste for this study, as its method of generation is different to other IC&I wastes. The construction and demolition industry will also innovate, and continue to develop more efficient construction methods. An allowance of 0.25% per year, beginning in 1993, and increasing by increments of 0.25% per year from 1993 to 2015 was applied to estimate source reduction in C&D waste generation each year. On this basis, reduction of C&D waste would reach 5.75% by the year 2015.

The estimated quantities of IC&I waste that will be reduced at source as a result of these three factors are presented in Schedule O. These quantities were subtracted from the total estimated IC&I waste to be generated in each GTA Region to estimate net waste generation by the IC&I sector in each Region from 1996 to the year 2015.

These estimates result in an overall source reduction of 5% of IC&I waste by the year 2000, measured against a 1992 baseline, and 17.2% by the year 2015, measured against a 1992 baseline.

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13.0 ASSESSMENT AND EVALUATION OF THE 3Rs SYSTEMS

13.1 Overview

This section of the report details the net effects analysis process undertaken by the Service discipline. The six residential and six IC&I systems were measured and compared according to a set of established criteria. The relative importance of each criterion was evaluated and weighted, in order to develop a hierarchy of highest to lowest ranked 3Rs systems for the Service discipline.

13.2 Approach Overview

A process consisting of five tasks was conducted to complete the Net Effects Analysis of GTA 3Rs Systems for the Service discipline. This included:

- completion of a Net Effects Analysis, for each Criteria Group, for each region, for each of six residential systems;
- completion of a Net Effects Analysis for each Criteria Group for each of six IC&I systems for the GTA;
- ranking of criteria according to utility to the analysis, level of importance of the criteria relative to others, as well as the magnitude, duration, significance and certainty of effects;
- a comparative evaluation of each residential system, based on the Net Effects Analysis of the service criteria was completed, for each GTA region;
- a comparative evaluation of each IC&I system, based on the Net Effects Analysis for the Service Criteria for the GTA as a whole.

13.2.1 Service Criteria

The Service Criteria Group contains four criteria which were applied to the components of each Residential and IC&I system to assess their impacts. Generic and region-specific Net Effects Tables were created in order to complete this analysis. These tables are presented in Schedules P and Q of this Appendix.

The criteria used for the Net Effects Analysis include:

- **Reliability**
  The reliability of each system was assessed according to whether the technologies which form the system had been proven reliable. Reliable was defined as a program that had operated successfully in at least one jurisdiction in the world, at full scale, for a period of at least one year. The issue of whether the system is dependent on the success of a single approach was also considered. Single approach systems are more susceptible to breakdown in the event of failure of any of the parts, and are therefore considered less reliable.
- **Flexibility**
  System flexibility was judged by the types and quantities of waste accommodated as well as by compatibility with the existing system. This criterion incorporates the ability of the system to adapt to changing waste characteristics and quantities.

- **Performance**
  System performance was judged according to the quantity of material diverted or disposed and the potential for marketing materials diverted. Where diversion achieved by two systems is within a 4% range, the two systems are ranked equally for this criterion. A difference of greater than 4% would rank one system higher than another for performance.

  Performance incorporates the issue of marketability of materials recovered. It was assumed that markets would be available for all recovered materials, although this is not necessarily the case at this time. Markets are discussed in detail in Schedule H of this Appendix, along with the limitations and problems for some materials.

- **Social Acceptability**
  The social acceptability of each system was evaluated on the basis of the potential effects of the systems on participation, attitudes and perception of the public of 3Rs activities as well as willingness to pay for the system.

13.2.2 Criteria Ranking

By considering the systems ranking by criteria and criteria rankings, an overall ranking for each system was completed. Systems were ranked from "lowest" to "highest".

13.2.2.1 Residential System Criteria Ranking

Ranking of individual criteria within the Service criteria group was completed on the basis of the level of importance of the criteria relative to the others. In order to rank the criteria, consideration was given to the magnitude, duration, significance and certainty of effects.

"Performance" and "Reliability" are considered to be of greatest and equal importance within the Service group. Performance measures the amount of waste diversion (tonnages diverted expressed as a percentage of waste generation). Reliability measures whether systems are likely to work (due to technology and operational factors) and whether the system as a whole is vulnerable to break-down. These two criteria are given the highest ranking since, taken together, they provide the strongest and most reliable indicators of whether any significant measure of waste diversion has been or is likely to be achieved, on a consistent, sustainable basis. They provide the best means of assessing the significance, certainty, and magnitude of effects, and they highlight the difference among options.

Any systems that received a mix of lowest and highest ranking for Reliability and Performance (the two top ranked criteria) were ruled out of contention as highest ranked systems. Any such systems were then evaluated by Social Acceptability and Flexibility.

Where two systems received similar combined rankings, the system that achieves significantly greater diversion would have potential to be higher ranked, since it achieves the goal of maximizing diversion.

The criterion "Social Acceptability" was ranked second in importance. This criterion measures whether the public is likely to reject or accept a system. It provides an indicator of whether residents will participate in source separation and other programs that are fundamental to ensuring diversion performance. This criterion is helpful in evaluating the certainty and duration of effects.

Flexibility was ranked lowest in importance. This criterion evaluates systems according to the type and quantities of waste accepted and system compatibility with the Existing or Existing/Committed system. The logic behind such a criterion is that systems which are proven to be incapable of expansion or that demand significant alteration of existing systems are likely to be faced with greater challenges in terms of ensuring public participation. However, some systems which are not compatible with the existing system have significant benefits in other areas, and should not be discounted due to lack of flexibility.

The Residential system criteria rankings for the Service Criteria Group are presented in Table 13.1.

13.2.2.2 IC&I System Criteria Ranking

For the IC&I Service criteria, three criteria, "Performance", "Reliability" and "Social Acceptability" were considered to be of greatest and equal importance. These criteria are given the highest ranking since, taken together, they provide the strongest and most reliable indication of whether any significant measure of waste diversion is likely to be achieved by the six IC&I systems considered. They provide the best means of assessing the significance, certainty, and magnitude of effects, and highlight the difference among options.

"Performance" measures the amount of waste diversion (tonnes diverted expressed as a percentage of waste generation). This best assesses the significance and magnitude of waste diversion effects among the options. "Reliability" measures whether systems are likely to work (due to technology and operational factors) and whether the system as a whole is vulnerable to break-down. Reliability is necessary to guarantee the diversion level estimated for the systems. "Social Acceptability" measures whether institutions (mostly in the private sector) are likely to comply with system requirements that are fundamental to ensuring diversion, and therefore performance. This criterion is helpful in evaluating the certainty and duration of effects.

"Flexibility" was ranked lowest in importance of the four service criteria for evaluating IC&I systems. It evaluates the range of types and quantities of waste accepted by different systems, and whether these can be varied. The logic behind such a criterion is that systems which are proven to be incapable of expansion or modification are likely to be faced with greater challenges in terms of ensuring service and diversion, if the quantity and composition of the waste stream varies. However, this criterion is not considered essential to provision of a successful IC&I waste diversion system as most of the materials generated can be managed by the Existing System (which is therefore considered flexible).

The IC&I system criteria rankings for the Service Criteria Group are presented in Table 13.2 along with the rationale for these rankings.

13.2.3 System Net Effects Analysis

The net effects analysis of the six residential systems was not specifically undertaken for each Region. Due to the large overlap of components for the six systems between the four Regions (Durham, Metro Toronto, York and Peel), the analysis was completed at a generic level of detail. These generic systems included all potential 3Rs components for a particular regional system. Potential effects, mitigation and net effects were developed for each component category within a system and presented in tabular form. The component categories included a group of components with similar characteristics. This generic analysis was completed for each indicator of the criteria within the Service Criteria Group.

TABLE 13.1

RESIDENTIAL SYSTEMS FOR GTA REGIONS
SERVICE CRITERIA RANKING

Criterion	Rank Order[1]	Rationale
Reliability	1	This criterion is ranked highest as the reliability of a waste diversion system is essential to providing a given level of service. Reliability is a good measure that can be used for distinguishing between different systems. Also, the level of confidence with which diversion of a system can be estimated and maintained with some degree of confidence is an important factor in the final choice of system.
Flexibility	3	Flexibility addresses the range and quantity of materials which can be diverted by a given system, and how compatible it is with the Existing System. Flexibility is ranked least important of the four criteria in the service group, as it is not an essential feature of a waste diversion system. It is an advantage if a system is flexible but other criteria are considered more important.
Performance	1	Performance (measured as tonnes diverted or % diversion) is considered the most important criterion within the service group, as it measures how effective a waste diversion system will be. If performance is not reasonable, then a diversion system should be eliminated from serious consideration, as performance is an essential requirement of any system.
Social Acceptability	2	Social acceptably is ranked second in importance in the service grouping as it is considered important, but not essential, that a system be socially acceptable. Many waste diversion systems become socially acceptable over time, even though they do not have strong social acceptability when initially implemented.

1. A ranking of "1" represents the criterion considered to be most important.

TABLE 13.2

GREATER TORONTO AREA IC&I SYSTEMS SERVICE CRITERIA RANKING

Criterion	Rank Order[1]	Rationale
Reliability	1	Reliability is ranked one of the most important criteria since reliability of a waste diversion system affects performance and participation. Reliability requires a reasonable degree of confidence in performance of the system, and is an essential feature of a successful system. The major distinguishing feature among systems with respect to reliability is the extent to which technologies used or required, have been used or proven elsewhere and are proven to be effective.
Flexibility	2	Flexibility addresses the range and quantity of wastes processed, and compatibility with the existing system. Flexibility is ranked as the least important criterion in the service group as it is not an essential feature of the IC&I waste management system, although flexibility is an advantage where present.
Performance	1	Performance (measured as tonnes diverted or % diversion) is considered one of the most important criteria within the service group, as it measures how effective a waste diversion system will be. If performance is not sufficient, then a diversion system does not meet its basic objective of diverting waste from disposal.
Social Acceptability	1	Social acceptability is considered as one of the most important criteria in the service group for IC&I systems, as it attempts to measure the burden imposed on individual firms by the different systems, and the extent to which they will respond, and participate in more stringent regulatory or cost requirements. It assists in distinguishing between systems, as those which do not expect reasonable participation will be unable to achieve high diversion levels.

1. A ranking of "1" represents the criterion considered to be the most important.

The generic system net effects by component were then reviewed with respect to the specific regional 3Rs system description. The purpose of this step was to complete a net effects analysis for each individual system for each Region. The specific regional system descriptions including the identification of components, allowed the corresponding net effects to be identified from the generic system net effects. The net effects for each component category of a particular system were then combined for each criteria indicator, into system net effects by indicator.

The system net effects for each indicator of a criterion were then combined. The resultant system net effects by criterion were used to complete the evaluation of systems. The advantages/disadvantages of each system, relative to the other systems, were also developed by criterion. Net effects common to all systems were not carried forward as advantages or disadvantages because they were not useful in comparing the systems.

Once the net effects assessment was completed for each 3Rs system within a Region, the six systems were then evaluated. By comparing the relative advantages and disadvantages between the six systems, the systems were ranked for each of the four service criteria. The systems were ranked from highest to lowest for each criterion.

The system rankings for each criterion were then considered in conjunction with a ranking of the Service criteria. The relative differences and trade-offs among the systems were examined based on the importance of the criteria. The result was the development of the overall system rankings for each Region within the Service Criteria Group.

A similar net effects assessment and evaluation of alternative 3Rs systems was completed for the IC&I sector. However, because the IC&I systems were developed for the GTA as a whole, the system net effects tables by component were completed on the same basis, and were not completed in a generic manner.

13.2.4 Mitigation and Enhancement Measures

13.2.4.1 Residential System Mitigation

The net effects analysis of Residential systems included consideration of steps for enhancement of each component and potential mitigation of problems identified. However, the effects of specific mitigation measures on service (diversion) have not been quantified in the net effects analysis for the service discipline because there are insufficient data. In many cases, some problems or negative effects have been noted as continuing, even after mitigation.

The following mitigation measures for residential systems, however, are assumed to occur:

Criterion	Indicator	Generic Mitigation
Reliability	Proven technology	• suitable adaptation of technology to local conditions • management and effective process control • provision of contingency and back-up options • appropriate staff training to ensure proper operation and reliability • promotion and education to increase effective participation
	Degree of reliance on single approach	• promotion of back-up and/or modified components (approach remains the same) to reduce risk of failure • promotion and education to increase effective participation
Flexibility	Types and range of materials, and quantities of waste accepted	• modification of components (approach remains the same) to handle increased range and quantity of materials • promotion and education to increase effective participation
	Compatibility with Existing System	• none applicable
Performance	Quantities of waste diverted	• adequate public education to ensure low contamination rates • promotion campaigns to ensure high participation rates • suitable system design and implementation for local conditions • on-going market development • support for innovation • on-going research to increase participation levels in multi-family dwellings

13.2.4.2 <u>IC&I System Mitigation for Service</u>

The net effects analysis of the IC&I systemsincluded consideration of steps for enhancement of each component and potential mitigation of problems identified. However, the effects of specific mitigation measures on service (diversion) have not been quantified in the net effects analysis for the service discipline because there are insufficient data. In many cases, some problems or negative effects have been noted as continuing, even after mitigation.

The following mitigation measures for IC&I systems are, however, assumed to occur:

Criterion	Indicator	Generic Mitigation
Reliability	Proven technology	• suitable adaptation of technology to local conditions • management and effective process control • provision of contingency and back-up options (approach remains the same) to reduce risk of failure • appropriate staff training to ensure proper operation and reliability • encouragement of compliance and voluntary participation in conditions of regulations
Flexibility	Types and range of materials, and quantities of waste accepted	• modification of components (approach remains the same) to handle increased range and quantity of materials • encouragement of compliance and voluntary participation in conditions of regulations
Performance	Quantities of waste diverted	• encouragement for compliance and voluntary participation in conditions of regulations • suitable system design and implementation for local conditions • on-going market development • support for innovation - research and development

13.3 Residential Systems for Region of Durham

Table 13.3 presents a comparative evaluation of residential systems for the Region of Durham. It summarizes system ranking by Service criteria, and overall residential system ranking for Service.

13.3.1 Reliability

Since the technology has been proven (specifically for the Region of Durham) and the systems are diverse, Systems 1 and 2 (Existing and Existing/Committed) were ranked highest for reliability.

Systems 3 and 4 (Direct Cost and Expanded Blue Box respectively) were equal, and ranked second highest. System 3 (Direct Cost) is based on an approach that is proven although it is based, to a degree, on reliance on a single approach (economic incentive) to produce high participation in diversion systems. System 4 (Expanded Blue Box) is also based on proven technology and it relies extensively on public participation for its success.

TABLE 13.3

REGION OF DURHAM

RESIDENTIAL SYSTEMS RANKING SUMMARY FOR SERVICE

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing/ Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Second lowest**	**Second highest**	**Highest**	**Third highest**	**Lowest**	**Second Lowest**
Reliability	Highest due to: • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	Highest due to: • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	Second highest due to: • technologies presently exist and are proven • success relies on economic incentive to increase voluntary source separation by single-family residents • relies also on integration of social approaches	Second highest due to: • technologies presently exist and are proven • relies on increased public participation achieved through extensive education and promotion • also relies on integration of several approaches	Second lowest due to: • technology proven at small scale in North America and at larger scale in Europe • effect of failure is significant as handling of 3 streams are linked in one system. However not readily prone to failure • relies on increased public participation to effectively source separate residential waste into three streams • increased public participation achieved through extensive promotion/education	Lowest due to: • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation	Lowest due to: • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation
Flexibility	Lowest due to: • existing infrastructure handles limited range and quantity of materials • organic materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited	Lowest due to: • existing infrastructure handles limited range and quantity of materials • wet materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited but 3Rs regulations require service	Lowest due to: • existing infrastructure handles limited range and quantity of materials • very compatible with existing/ committed system • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	Third highest due to: • collects wider range and higher quantities of materials • compatible with and expands on existing/ committed system • depends on homeowner for success • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	Second highest due to: • collection of wider range and greater quantities of materials (including wet organic waste and others not captured in residential Blue Box programs) • new MRF and new centralized compost plant required to accommodate increased range and quantities of materials • requires fundamental change (modified source separation) to existing system for residential participation (essential to success)	Highest due to: • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality doesn't meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters	Highest due to: • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality unlikely to meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters
Performance	Lowest due to: • waste diversion of 26% to 29% by the year 2000	Lowest due to: • waste diversion of 30% to 33% by the year 2000	Second lowest due to: • waste diversion of 43% to 46% by the year 2000	Second lowest due to: • waste diversion of 44% to 47% by the year 2000	Second highest due to: • waste diversion of 56% to 59% by the year 2000 • significant diversion of food waste (74%)	Second highest due to: • waste diversion of 60% to 63% by the year 2000 • limited source separation may decrease market value of secondary materials • significant diversion of food waste	Highest due to: • waste diversion of 77% to 80% by the year 2000 • limited source separation may decrease market value of secondary materials • significant diversion of food waste

Table 13.3 (cont'd)

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing/ Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Second lowest**	**Second highest**	**Highest**	**Third highest**	**Lowest**	**Second Lowest**
Social Acceptability	**Third highest ranked due to:** • maintains existing 3Rs participation as residents and municipalities are familiar with the requirements of the System. • not likely to encourage greater individual action. • some positive attitudes and perceptions toward 3Rs activities. • residents likely willing to pay for the System (low tax increase).	**Third highest ranked** due to: • potential for minor positive increase in 3Rs participation because of increased opportunities (e.g., for multi-family residences). • generally positive attitudes and perceptions toward 3Rs activities. • residents' willingness to pay increased costs of the System uncertain (moderate tax increase).	**Second highest ranked** due to: • potential for greater participation through greater source separation of materials (financial incentive); increased composting opportunities; and, greater promotion and education. • direct cost charges not implemented in most multi-family buildings; no additional incentives for these households. • difficult to implement composting in multi-family housing and unlikely to significantly increase participation (low proportion of households in Durham). • uncertain of implementation of direct cost in rural, self haul areas. • potential for public controversy. • residents' willingness to pay increased costs of the System uncertain (moderate tax increase).	**Highest ranked** due to: • potential for greater participation through: greater source separation of more materials; increased composting opportunities; greater promotion and education; and, targeting of all housing types. • positive attitudes and perceptions towards 3Rs activities because residents familiar with System requirements. • residents' willingness to pay for the System uncertain (moderate tax increase).	**Second lowest ranked** due to: • potential for reduced participation because of: a variety of inconveniences from collection activities and odour and health concerns related to effects from food waste composting; limited application to high-rise residences; and, uncertain application to rural residences. • potential for negative attitudes and perceptions to the System because of inconveniences and health concerns. • people are unwilling, unable or lack knowledge to source separate properly, resulting in potential for contamination of dry stream. • residents may be unwilling to pay for the System (moderate to high tax increase).	**Lowest ranked** due to: • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facility may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).	**Lowest ranked** due to: • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facility may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).

System 5 (Wet/Dry) is ranked second lowest because it relies on a single approach (extensive public participation to successfully source separate waste into three streams). The technology is proven at full scale in small counties in North America but not in a community comparable to GTA Regions. Larger scale systems have been successfully implemented in Europe for a number of years.

Systems 6A and 6B (Mixed Waste Processing with low and high quality finished compost) were ranked equally and lowest because they are based on technology that is widely used but still experiences technical problems. They also rely on a single approach for the "third bag" of waste.

13.3.2 Flexibility

Systems 6A and 6B (Mixed Waste Processing with low and high quality finished compost) were ranked highest for Flexibility because they can accommodate the full range and quantity of residential materials generated in Region of Durham. Both systems are compatible with the existing collection system and lead to significantly increased waste diversion.

System 5 (Wet/Dry) was ranked second highest as it collects a wide range and greater quantity of dry materials than Systems 1 to 3. It provides a convenient method of diverting significant quantities of wet waste from disposal and is therefore more flexible than all other systems except Mixed Waste Processing. It was limited by the fundamental changes required to the existing system for residential participation.

System 4 (Expanded Blue Box) was judged third highest for flexibility. While it collects a wider range and quantity of dry materials than the Existing/Committed system, and is compatible with the Existing/Committed System, the overall projected quantities of materials collected are lower than in some systems.

Systems 1, 2 and 3 (Existing, Existing/Committed and Direct Cost) are each ranked as lowest for flexibility. Each are compatible with the Existing System, but they do not markedly expand the range of materials collected, although the quantities of each material collected are higher in System 3 than in Systems 1 and 2.

13.3.3 Performance

System 6B (Mixed Waste Processing with high quality finished compost) was ranked highest due to its ability to divert 77% to 80% of residential waste by the year 2000. System 6A (Mixed Waste Processing with low quality finished product) was ranked second highest with potential to divert 60% to 63% of residential waste. System 5 (Wet/Dry) was also ranked second highest due to potential to divert 56% to 59% of residential waste.

Systems 3 (Direct Cost) and System 4 (Expanded Blue Box) are ranked equal and second lowest. System 4 has potential to attain slightly higher diversion (44% to 47% compared to 43% to 46% for Direct Cost).

System 1 (Existing) and System 2 (Existing/Committed) are both ranked lowest due to the low level of material diverted. System 1 diverts 26% to 29% while System 2 would divert 30% to 33% of materials.

13.3.4 Social Acceptability

System 4 (Expanded Blue Box) was ranked highest because Durham residents and municipalities are familiar with the System components and the infrastructure and can be expected to respond more quickly and more positively to the System. System 4 will provide an improved level of service to residents over Systems 1 and 2 which is likely to encourage

greater participation. However, the willingness of residents to pay the tax increase (a moderate impact) is uncertain but the increase is lower than for Systems 5 and 6.

System 3 (Direct Cost) was ranked the second highest because it has the potential to encourage greater participation in 3Rs (increased composting and source separation) than other systems because of the economic incentive and it is suitable for the low density urban areas of Durham. There is a greater possibility of illegal dumping and burning (with the potential for negative attitudes to be developed toward the System) than in the other systems. Also, direct cost charges will not be implemented in apartment households, reducing participation and limiting the potential for a change in attitude to greater support for 3Rs. There is some uncertainty about the willingness of residents to pay the tax increase and about the level of participation by rural residents. In addition, there is greater potential for public controversy than for Systems 1,2,4 and 5.

Systems 1 (Existing) and 2 (Existing/Committed) were the third highest ranked because, although residents are familiar with the components of these Systems, the components are unlikely to stimulate increased participation by individuals in 3Rs activities to the same extent as Systems 3,4 and 5. System 1 costs are likely to be acceptable to residents while the acceptability of System 2 costs is uncertain but System 2 is likely to encourage a minor increase in participation over System 1.

System 5 (Wet/Dry) was ranked second lowest. Despite the increased 3Rs opportunities this System offers, its acceptability is reduced because of the odour, health and vermin effects from food waste composting facilities. It may also be difficult for elderly and disabled groups in Durham Region to participate in this System and the effectiveness of the System in rural areas and apartments is uncertain. The willingness of residents to pay the tax increase is uncertain (higher tax increase than Systems 1 to 4).

System 6 (Mixed Waste Processing) was ranked lowest because the mixed waste processing and composting facility operations may not be acceptable due to potential significant odour problems. The System does not encourage source separation and could encourage residents to reduce their participation in some of the components of the System (e.g., Blue Box). There are also significantly higher costs for the mixed waste processing and composting facility that are likely to be unacceptable to Durham Region residents and municipalities.

13.3.5 Overall System Ranking - Durham

In the Region of Durham, the system ranking under the Service Criteria Grouping was:

Rank	System
Highest	System 4 - Expanded Blue Box
Second highest	System 3 - Direct Cost
Third highest	System 5 - Wet/Dry
Second lowest	System 1 - Existing
Second lowest	System 2 - Existing/Committed
Second lowest	System 6B - Mixed Waste Processing (high quality compost)
Lowest	System 6A - Mixed Waste Processing (low quality compost)

In the Region of Durham, Systems 1 and 2 (Existing and Existing/Committed) were ranked highest for reliability (since the technologies are proven and not prone to failure) and lowest

for performance (due to low diversion). System 6B (Mixed Waste Processing, high quality compost) achieved highest diversion, but was ranked lowest for reliability due to reliance on a technology that is widely used but experiences operational problems. These three systems were therefore eliminated from consideration as the highest ranked system.

Systems 3, 4, 5 and 6A were compared to determine the highest ranked. Of these, Systems 3, 4 and 5 were ranked similarly for the combination of performance and reliability which are the two most important criteria. System 5 achieved second highest diversion and was considered second least reliable, while Systems 3 and 4 both achieved second lowest diversion and were considered second most reliable. System 4 was ranked highest for social acceptability, and third highest for flexibility (which is the least important criterion). Because social acceptability is more important than flexibility, System 4 was ranked highest overall.

In comparison, System 3 (Direct Cost) was ranked second highest for social acceptability but lowest for flexibility since it collects only a limited range of materials. It therefore received an overall ranking of second highest.

System 5 (Wet/Dry) was ranked lower for social acceptability than Systems 3 and 4 (ranked second lowest due to potential inconveniences, odour problems etc.) and second highest for flexibility (the lowest ranked criterion) since it collects a wider range of materials, including organics . Although its ranking on social acceptability was lower than Systems 1 and 2, it achieved more potential diversion than either of these systems. It was therefore ranked third highest overall.

Systems 1 and 2 (Existing and Existing/Committed) were ranked second lowest overall. They were considered the most reliable of all systems but they also achieve the lowest diversion of all systems. System 2 is considered as socially acceptable as System 1 (both ranked third highest), but less so than Systems 3 and 4, since both Systems 1 and 2 do little to increase participation in diversion. They are also considered least flexible of all systems because the range and quantities of materials collected are not expanded.

In comparison, System 6B is considered least reliable (due to reliance on a technology that experiences on-going operational problems), but achieves highest diversion. It is considered less socially acceptable (ranked lowest) than Systems 1 and 2 due to potentially high tax increases and potential reductions in Blue Box participation. It is the most flexible of all systems, but since this criterion is considered least important it is ranked equally with Systems 1 and 2 as second lowest.

System 6A was ranked lowest overall. It achieves second highest diversion, but like System 6B, is considered least reliable. With System 6B, it is considered least socially acceptable although it is the most flexible of all the systems (expanding the range and quantities of materials collected). As this is the lowest ranked criterion and because its diversion is significantly lower than System 6B, this system is ranked lowest overall.

13.4 Residential Systems for Metro Toronto

Table 13.4 presents a comparative evaluation of residential systems for the Metro Toronto. It summarizes system ranking by Service criterion, and overall residential system ranking for Service for Metro Toronto.

TABLE 13.4

METROPOLITAN TORONTO
RESIDENTIAL SYSTEMS RANKING SUMMARY FOR SERVICE

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Third lowest**	**Second highest**	**Highest**	**Third highest**	**Lowest**	**Second Lowest**
Reliability	**Highest due to:** • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	**Highest due to:** • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	**Second highest due to:** • technologies presently exist and are proven • success relies on economic incentive to increase voluntary source separation by single-family residents • relies also on integration of social approaches	**Second highest due to:** • technologies presently exist and are proven • relies on increased public participation achieved through extensive education and promotion • also relies on integration of several approaches	**Second lowest due to:** • some Metro residents participated in a Wet/Dry pilot project • technology proven at small scale in North America and at larger scale in Europe • effect of failure is significant as handling of 3 streams are linked in one system. However not readily prone to failure • relies on increased public participation to effectively source separate residential waste into three streams • increased public participation achieved through extensive promotion/education	**Lowest due to:** • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation	**Lowest due to:** • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation
Flexibility	**Lowest due to:** • existing infrastructure handles limited range and quantity of materials • organic materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited	**Second lowest due to:** • existing infrastructure handles limited range and quantity of materials • partially expanded range of materials will be maintained • new materials (fine paper, pizza boxes, polycoat) added to Blue Box) • wet materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited but 3Rs regulations require service	**Third lowest due to:** • existing infrastructure handles limited range and quantity of materials • very compatible with existing/ committed system • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	**Third highest due to:** • collects wider range and higher quantities of materials • compatible with and expands on existing/ committed system • depends on homeowner for success • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	**Second highest due to:** • collection of wider range and greater quantities of materials (including wet organic waste and others not captured in residential Blue Box programs) • new MRF and new centralized compost plant required to accommodate increased range and quantities of materials • requires fundamental change (modified source separation) to existing system for residential participation (essential to success)	**Highest due to:** • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality doesn't meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters	**Highest due to:** • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality unlikely to meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters

Table 13.4 (cont'd)

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Third lowest**	**Second highest**	**Highest**	**Third highest**	**Lowest**	**Second Lowest**
Performance	Lowest due to: • limited waste diversion of 19% or up to 22% by the year 2000	Lowest due to: • limited waste diversion of only 21% or up to 24% by the year 2000	Second lowest due to: • estimated waste diversion of 29% or up to 32% by the year 2000	Second lowest due to: • estimated waste diversion of 33% or up to 36% by the year 2000	Third highest due to: • estimated waste diversion of 44% or up to 47% by the year 2000 • significant diversion of food waste (64%)	Second highest due to: • estimated waste diversion of 52% or up to 55% by the year 2000 • limited source separation may decrease marked value of secondary materials • significant diversion of food waste	Highest due to: • potential for 72% to 75% waste diversion by the year 2000 • limited source separation may decrease marked value of secondary materials • significant diversion of food waste
Social Acceptability	Second lowest ranked due to: • maintains existing 3Rs participation as residents and municipalities are familiar with the requirements of the System. • not likely to encourage greater individual action. • some positive attitudes and perceptions toward 3Rs activities. • residents likely willing to pay for the System (low tax increase).	Second highest ranked due to: • potential for minor positive increase in 3Rs participation because of increased opportunities (e.g., for multi-family residences). • generally positive attitudes and perceptions toward 3Rs activities. • residents likely willing to pay for the System (low tax increase).	Third highest ranked due to: • potential for greater participation through greater source separation of materials (financial incentive); increased composting opportunities; and, greater promotion and education. • direct cost charges not implemented in most multi-family buildings; no additional incentives for these households.• difficult to implement composting in multi-family housing and unlikely to significantly increase participation (significant proportion of households in Metro). • potential for public controversy. • residents likely willing to pay increased costs of the System (low tax increase).	Highest ranked due to: • potential for greater participation through: greater source separation of more materials; increased composting opportunities; greater promotion and education; and, targeting of all housing types. • positive attitudes and perceptions towards 3Rs activities because residents familiar with System requirements. • residents likely willing to pay for the System (low tax increase).	Second lowest ranked due to: • potential for reduced participation because of: a variety of inconveniences from collection activities and odour and health concerns related to effects from food waste composting; and, limited application to high-rise residences. • potential for negative attitudes and perceptions to the System because of inconveniences and health concerns. • people are unwilling, unable or lack knowledge to source separate properly, resulting in potential for contamination of dry stream. • residents likely willing to pay for the System (low tax increase).	Lowest ranked due to: • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facilities may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).	Lowest ranked due to: • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facilities may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).

13.4.1 Reliability

Since the technology has been proven (specifically for Metro Toronto) and the systems are diverse, Systems 1 and 2 (Existing and Existing/Committed) were ranked equally and highest with respect to reliability. Systems 3 and 4 (Direct Cost and Expanded Blue Box respectively) were considered equal, and ranked second highest. System 3 (Direct Cost) is based on a proven approach whose reliability is somewhat dependent on a single approach (economic incentive to encourage high participation in diversion systems) which does not affect multi-family housing (which makes up a large portion of Metro households). For these reasons, it is less reliable than are Systems 1 and 2.

System 4 (Expanded Blue Box) is based on proven technology and is supported by public participation but is not reliant on a single approach.

System 5 (Wet/Dry) is ranked second lowest as it relies somewhat on a single approach (extensive public participation to successfully source separate household waste into three streams). While the technology is proven, it may be limited in its ability to include multi-family buildings which make up a significant proportion of Metro's housing stock (48.6%), and it is proven only in small-scale projects in North America.

Systems 6A and 6B (Mixed Waste Processing with low and high quality finished compost) were both ranked lowest because they are based on a technology that is widely used but still experiences technical problems. Systems 6A and 6B also rely on a single approach for the "third bag" of waste.

13.4.2 Flexibility

Systems 6A and 6B (Mixed Waste Processing with low and high quality finished compost) were ranked highest for flexibility because they can handle the full range and quantity of residential materials. Both systems were judged to be compatible with the existing collection system and to lead to significantly increased waste diversion.

System 5 (Wet/Dry) was ranked second highest as it collects a wider range and greater quantity of dry materials than Systems 1, 2 and 3. System 5 also provides the capacity to divert significant quantities of wet household (food and yard) waste, which cannot be diverted to the same extent by Systems 1 to 4.

System 4 (Expanded Blue Box) was ranked third highest for flexibility. It collects a wider range and quantity of dry materials than Systems 1, 2 and 3, and is compatible with the Existing/Committed system. However, the overall projected quantities of materials collected are lower than in some systems and it does not have the flexibility to divert significant quantities of wet materials.

System 3 (Direct Cost) is ranked third lowest. It is compatible with the Existing System and is ranked higher than System 2 because it diverts higher quantities of the same range of materials. System 2 (Existing/Committed) is ranked second lowest. While compatible with the Existing System, it will handle only a slightly increased range of materials. System 1 (Existing) is ranked lowest because it diverts a more limited range and quantity of materials, when compared to the other systems.

13.4.3 Performance

System 6B was ranked highest for performance because it is estimated to divert 72% to 75% of the residential waste stream by the year 2000, although the potential lower quality of secondary materials may reduce their marketability.

System 6A (Mixed Waste Processing with low quality finished compost) was ranked second highest with potential to divert 52% to 55% of the residential waste stream. System 5 was ranked third highest with potential to divert 44% to 47% of the residential waste stream. The reason for the lower diversion potential of this system, compared with other GTA Regions, is the limited ability to collect all multi-family housing waste in three source separated streams.

System 3 (Direct Cost) and System 4 (Expanded Blue Box) are ranked equally and second lowest. System 3 offers diversion potential between 29% and 32% while System 4 has potential to divert between 33% and 36% of the residential waste stream.

System 1 (Existing) and System 2 (Existing/Committed) are ranked lowest, due to the lower level of material diverted, with a range of 19% to 22% (Existing) and 21% to 24% (Existing/Committed) respectively.

13.4.4 Social Acceptability

System 4 (Expanded Blue Box) was ranked highest because Metro residents and municipalities are familiar with the System components and the infrastructure and can be expected to respond more quickly and more positively to the System. System 4 appears to be more suitable to the broad range of housing density patterns in Metro than either Systems 3 or 5, equal to System 6 and more comprehensive than either Systems 1 or 2. Therefore, System 4 should lead to increased participation, and improved attitudes and perceptions. Residents will likely be willing to pay the tax increase for the System.

System 2 was ranked the second highest because it has greater potential for positive attitudes and participation than System 1 and it will not encounter the potential public controversy of System 3. It does not have the same inconveniences as System 5 which reduce that System's participation; and residents are more willing to pay for this System than System 6.

System 3 (Direct Cost) was ranked third highest. While it provides greater opportunities than System 2 (Existing/Committed) for composting and source reduction, there is the likelihood of some initial negative attitudes associated with the Direct Cost System. More importantly, System 3 (Direct Cost) may have little effect in increasing participation in high-rise apartments beyond that of System 2 (Existing/Committed). It will not provide the incentive to these residents to participate and is not likely to increase positive attitudinal change. The Direct Cost System also has a higher potential for illegal dumping than any other System, with the potential for negative attitudes to be developed toward the System.

System 5 (Wet/Dry) was ranked second lowest. In the low-density areas of Metropolitan Toronto, this System may be acceptable with strong participation and some increase in positive attitudes, although some concerns are expected to be expressed about the convenience of the System. Residents will likely be willing to pay the increase in taxes. In Metro's high-density areas (a large proportion of households) this System may create negative attitudes and lead to low participation rates. The concerns are likely to focus primarily on the health, odour and nuisance effects of the "wet" stream, and how it is collected and managed in highrise apartments.

System 1 (Existing) was also ranked second lowest because it provides limited support for continuing positive change in 3Rs behaviours and it provides fewer 3Rs opportunities than any of the other systems. However, it has few negative attitudes associated with the System components; residents are likely willing to pay for the System; and, it has little or no potential for public controversy.

System 6 (Mixed Waste Processing) was ranked the lowest. Due to the potential odour effects, there is likely to be significant opposition to a mixed solid waste processing and composting facility. The components of this System are available to all households (equal to Expanded Blue Box) and it encourages 3Rs involvement. However, there is the potential for the System to deter many people from source separating, reducing their participation in 3Rs and potentially reducing positive attitudes and behaviour to 3Rs. The convenience of disposing of all waste, knowing that it will be separated elsewhere, may prompt some Metro residents to stop separating their waste. Furthermore, residents and municipalities may not be willing to pay the higher tax increase required with this System.

13.4.5 Overall System Ranking - Metro Toronto

Residential system ranking for Metro Toronto for the Service Criteria Group was:

Rank	System
Highest	System 4 - Expanded Blue Box
Second highest	System 3 - Direct Cost
Third highest	System 5 - Wet/Dry
Third lowest	System 2 - Existing/Committed
Second lowest	System 1 - Existing
Second lowest	System 6B - Mixed Waste Processing (high quality compost)
Lowest	Systems 6A - Mixed Waste Processing (low quality compost)

In Metro Toronto, System 6B received a highest ranking for performance with a lowest ranking for reliability. The same was true (in reverse) for the Existing and the Existing/Committed Systems which received highest rankings for reliability and lowest for performance. The three systems were therefore eliminated from consideration as the highest ranked systems.

Systems 3, 4, 5 and 6A were then compared to determine the highest ranked system. All four systems received comparable rankings on the combinations of highest ranked criteria (performance and reliability). Systems 3 (Direct Cost) and 4 (Expanded Blue Box) achieved second lowest diversion and were considered second most reliable. System 6A Mixed Waste Processing (low quality compost) achieved second highest diversion but was considered least reliable, while System 5 (Wet/Dry) achieved third highest diversion but was considered second least reliable.

System 4 was ranked highest for social acceptability, and third highest for flexibility (which is the least important criterion). Because social acceptability is more important than flexibility, System 4 was ranked highest overall. In comparison, System 3 was ranked slightly lower for social acceptability and flexibility (third highest and third lowest respectively) and it was therefore ranked second highest overall. With a slightly lower rank for social acceptability (second lowest) and a second highest ranking for flexibility, System 5 was ranked third highest overall.

System 2 (Existing/Committed) achieved the lowest diversion but was considered most reliable overall. System 2 was ranked third lowest overall, since it was considered more

socially acceptable (ranked second highest) than Systems 1 (Existing) or 6A and 6B (Mixed Waste Processing with low and high quality compost) but less flexible than Systems 3, 4 and 5. Systems 1 and 6B both ranked second lowest. They received similar combined rankings (in reverse) on the top 2 criteria. System 6B was ranked lowest for social acceptability and highest for flexibility.

System 1 achieved lowest diversion and was ranked highest for reliability. It was considered second least socially acceptable and lowest for flexibility. The diversion achieved in System 6B is significantly higher than in System 1, as is the ranking for flexibility, and there is little difference in social acceptability. System 1 was therefore ranked second lowest, overall, along with System 6B.

System 6A was ranked lowest overall. It achieves second highest diversion (less than System 6B), but was considered least reliable of all systems. It is also considered least socially acceptable, and while it is most flexible of all systems, this is the least important criterion.

13.5 Residential Systems for Region of York

Table 13.5 presents the comparative evaluation of residential systems for the Region of York for the Service Criteria Group. It summarizes system ranking by service criterion, and overall residential system ranking for Service for the Region of York.

13.5.1 Reliability

Since the technology has been proven (specifically for the Region of York) and the systems are diverse, Systems 1 and 2 (Existing and Existing/Committed) were judged to be equal and ranked highest in terms of Reliability. Systems 3 and 4 (Direct Cost and Expanded Blue Box respectively) were ranked equal, and second highest. System 3 (Direct Cost) is based on an approach that is proven, however, it is based (to a degree) on reliance on a single approach (economic incentive to encourage high participation in waste diversion systems). System 4 (Expanded Blue Box) is also based on proven technology and it relies extensively on public participation for its success. Also, some Region of York residents (in Markham) are presently participating in a partially expanded program which has been successful.

System 5 (Wet/Dry) is ranked second lowest as it relies on extensive public participation and while technology is proven it may be limited in its ability to include multi-family buildings. Some communities in York are pursuing Wet/Dry projects. Markham is currently conducting a pilot study of Wet/Dry collection systems, and both Newmarket and Richmond Hill have considered collection of household organics in the past.

Systems 6A and 6B (Mixed Waste Processing with high and low quality finished compost) were both ranked lowest because they are based on a technology that is widely used but still experiences technical problems. They also rely on a single approach for the "third bag" of waste.

13.5.2 Flexibility

Systems 6A and 6B (Mixed Waste Processing with low and high quality finished compost) were ranked highest because they can handle the full range and quantity of residential materials generated in Region of York. They were judged to be compatible with the existing collection system and to lead to significantly increased waste diversion.

System 5 (Wet/Dry) was ranked second highest as it collects a wider range and greater quantity of the dry materials that are not regularly collected in Blue Box programs. System 5 provides the capacity to divert significant quantities of wet household waste which cannot be diverted by Systems 1 to 4. This system therefore has greater flexibility than Systems 1 to 4.

TABLE 13.5
REGION OF YORK
RESIDENTIAL SYSTEMS RANKING SUMMARY FOR SERVICE

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Third lowest**	**Second highest**	**Highest**	**Third highest**	**Lowest**	**Second Lowest**
Reliability	**Highest due to:** • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	**Highest due to:** • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	**Second highest due to:** • technologies presently exist and are proven • success relies on economic incentive to increase voluntary source separation by single-family residents • relies also on integration of social approaches	**Second highest due to:** • technologies presently exist and are proven • relies on increased public participation achieved through extensive education and promotion • also relies on integration of several approaches	**Second lowest due to:** • technology proven at small scale in North America and at larger scale in Europe • wet/dry pilot project in progress in Markham • effect of failure is significant as handling of 3 streams are linked in one system. However not readily prone to failure • relies on increased public participation to effectively source separate residential waste into three streams • increased public participation achieved through extensive promotion/education	**Lowest due to:** • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation	**Lowest due to:** • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation
Flexibility	**Lowest due to:** • existing infrastructure handles limited range and quantity of materials • organic materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited	**Lowest due to:** • existing infrastructure handles limited range and quantity of materials • wet materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited but 3Rs regulations require service (low % of multi-family dwellings means limited opportunity to increase diversion)	**Second lowest due to:** • existing infrastructure handles limited range and quantity of materials • very compatible with existing/ committed system • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	**Third highest due to:** • collects wider range and higher quantities of materials • compatible with and expands on existing/ committed system • depends on homeowner for success • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	**Second highest due to:** • collection of wider range and greater quantities of materials (including wet organic waste and others not captured in residential Blue Box programs) • new MRF and new centralized compost plant required to accommodate increased range and quantities of materials • requires fundamental change (modified source separation) to existing system for residential participation (essential to success)	**Highest due to:** • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality doesn't meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters	**Highest due to:** • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality unlikely to meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters

Table 13.5 (cont'd)

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Third lowest**	**Second highest**	**Highest**	**Third highest**	**Lowest**	**Second Lowest**
Performance	Lowest due to: • limited waste diversion of only 28% or up to 31% by the year 2000	Lowest due to: • limited waste diversion of only 29% or up to 32% by the year 2000	Second lowest due to: • waste diversion of 43% or up to 46% by the year 2000	Second lowest due to: • waste diversion of 44% or up to 47% by the year 2000	Second highest due to: • waste diversion of 57% or up to 60% by the year 2000 • significant diversion of food waste (75%)	Second highest due to: • waste diversion of 59% or up to 62% by the year 2000 • limited source separation may decrease market value of secondary materials • significant diversion of food waste	Highest due to: • estimated ability to divert 77% to 80% waste by the year 2000 • limited source separation may decrease market value of secondary materials • significant diversion of food waste
Social Acceptability	Third highest ranked due to: • maintains existing 3Rs participation as residents and municipalities are familiar with the requirements of the System. • not likely to encourage greater individual action. • some positive attitudes and perceptions toward 3Rs activities. • residents likely willing to pay for the System (low tax increase).	Second highest ranked due to: • potential for minor positive increase in 3Rs participation because of increased opportunities (e.g., for multi-family residences). • generally positive attitudes and perceptions toward 3Rs activities. • residents' willingness to pay increased costs of the System uncertain (moderate tax increase).	Highest ranked due to: • potential for greater participation through greater source separation of materials (financial incentive); increased composting opportunities; and, greater promotion and education. • direct cost charges not implemented in most multi-family buildings; no additional incentives for these households. • difficult to implement composting in multi-family housing and unlikely to significantly increase participation (low proportion of households in York). • uncertain of implementation of direct cost in rural, self haul areas. • potential for public controversy. • residents' willingness to pay increased costs of the System uncertain (moderate tax increase).	Highest ranked due to: • potential for greater participation through greater source separation of more materials; increased composting opportunities; greater promotion and education; and, targeting of all housing types. • positive attitudes and perceptions towards 3Rs activities because residents familiar with System requirements. • residents' willingness to pay for the System uncertain (moderate tax increase)	Second lowest ranked due to: • potential for reduced participation because of: a variety of inconveniences from collection activities and odour and health concerns related to effects from food waste composting; limited application to high-rise residences; and, uncertain application to rural residences. • potential for negative attitudes and perceptions to the System because of inconveniences and health concerns. • people are unwilling, unable or lack knowledge to source separate properly, resulting in potential for contamination of dry stream. • residents may be unwilling to pay for the System (high tax increase).	Lowest ranked due to: • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facility may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).	Lowest ranked due to: • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facility may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).

System 4 (Expanded Blue Box) was ranked third highest. While it collects a wider range and quantity of dry materials than Systems 1 to 3 and is compatible with the Existing/Committed System, in the Region of York projected quantities of materials collected are lower than in some systems. It does not have the flexibility to divert significant quantities of wet materials.

System 3 (Direct Cost) is ranked second lowest for flexibility. It is compatible with the Existing/Committed system but collects a narrower range of materials than Systems 4, 5 and 6. System 2 (Existing/Committed) is ranked lowest along with System 1 (Existing), because of the limited range and quantity of material that these systems can divert when compared to Systems 3 to 6.

13.5.3 Performance

System 6B was ranked highest in terms of performance because it significantly increases the amount of material diverted (77% to 80% by the year 2000). System 6A (Mixed Waste Processing with low quality finished compost) was ranked second highest with potential to divert 59% to 62% of the residential waste stream. System 5 was also ranked second highest with potential to divert 57% to 60% of the residential waste stream.

Systems 3 (Direct Cost) and System 4 (Expanded Blue Box) are both ranked second lowest with diversion potential of 43% to 46% (System 3) and 44% to 47% (System 4).

Systems 1 (Existing) and System 2 (Existing/Committed) are ranked lowest, due to the lower level of material diverted. These systems are both estimated to divert 28% to 31% and 29% to 32% of the residential waste stream respectively.

13.5.4 Social Acceptability

Based on these indicators, System 4 (Expanded Blue Box) and System 3 (Direct Cost) were ranked the highest for social acceptability.

System 4 was ranked highest because York Region residents and municipalities are familiar with the System components and the infrastructure, and can be expected to respond more quickly and more positively to the System. System 4 is also suitable for the low density areas of York. In addition, all apartment buildings of more than 6 units will be provided with recycling services, providing an improved level of service to these residents. This will likely encourage greater participation. However, the willingness of residents to pay the tax increase (a moderate impact) is uncertain but the increase is lower than for Systems 5 and 6 and the same as System 3.

System 3 (Direct Cost) was also ranked highest because it has the potential to encourage greater participation in 3R's than System 1 (Existing) or System 2 (Existing/Committed) and System 4 (Expanded Blue Box). Potential problems in implementing Direct Cost in high-rise dwellings may not be significant in York due to the low proportion of multi-family households (about 11% of households). However, the willingness of residents to pay the tax increase, a moderate impact (equal to System 4), is uncertain. System 3 has the advantage over System 2 and System 4 of potentially encouraging greater participation by individuals and greater behavioural change to support 3Rs due to the economic incentive. The Direct Cost System may be controversial (i.e., perception of being "double taxed").

System 2 (Existing/Committed) was ranked as the second highest. It has greater potential for positive attitudes and participation than System 1. It will not encounter the same level of potential public controversy as System 3 and it does not have the same inconveniences as System 5, which reduce that System's participation. Residents are also more willing to pay for this system than Systems 5 and 6.

System 1 was ranked third highest. While this System does not offer the range of 3Rs opportunities identified in the other systems, the costs are acceptable and the possibility of controversy around System components is negligible in comparison with the other systems.

System 5 (Wet/Dry) was ranked second lowest. It has an advantage over Systems 1, 2 and 6 because it has greater potential to encourage stronger positive attitudes and behaviour toward the 3Rs. However, the acceptability of System 5 for York Region residents could be significantly reduced due to odour and vermin effects from the volumes of food waste being composted at the composting facility. There is also increased potential for some groups to participate less due to greater difficulty in using the 90 gallon carts (e.g.elderly and disabled) and for others not to separate food waste (due to the messiness and inconveniences associated with the carts). In addition, the effectiveness of a wet/dry system in rural areas and apartments is uncertain. Most importantly, residents and municipalities will likely be unwilling to pay the significantly higher costs for System 5.

System 6 (Mixed Waste Processing) was ranked the lowest because: the System costs are likely to be unacceptable to residents and municipalities; it does not encourage source separation and could reduce individual participation in some of the components of the System (e.g., Blue Box); and, the mixed waste processing and composting facility may not be acceptable due to potential significant odour problems.

13.5.5 Overall System Ranking - Region of York

Residential system ranking for Region of York for the Service Criteria Group was:

Rank	System
Highest	System 4 - Expanded Blue Box
Second highest	System 3 - Direct Cost
Third highest	System 5 - Wet/Dry
Third lowest	System 2 - Existing/Committed
Second lowest	System 1 - Existing
Second lowest	System 6B - Mixed Waste Processing (high quality compost)
Lowest	Systems 6A - Mixed Waste Processing (low quality compost)

System 6B received the highest ranking for performance, but the lowest ranking for reliability. The same was true (in reverse) for Systems 1 and 2 (Existing and Existing/Committed) which received highest rankings for reliability and lowest for performance. The three systems were therefore eliminated from consideration as top-ranked systems.

The remaining Systems 3, 4, 5 and 6A were compared to determine the highest ranked system. System 4 (Expanded Blue Box) was ranked highest overall. System 4 was ranked similarly with Systems 3 (Direct Cost) and 5 (Wet/Dry) on the combined top two criteria (performance and reliability), with rankings of second lowest for performance (due to low diversion) and second highest for reliability (since an expanded list of materials is already in place in some areas and the system is proven). System 4 was considered more socially acceptable (ranked highest) than System 5 (ranked second lowest) since residents are familiar

with the system and it is suitable to the low density character of York Region. It is also more flexible than System 3 because it provides opportunities to recycle a wide range of materials. For these reasons, System 4 was highest ranked for Service for Region of York.

System 3 (Direct Cost) was ranked second highest overall. Like System 4, it was considered most socially acceptable, but with a slightly narrower range of materials collected, it was considered less flexible (and ranked second lowest for the criterion). System 5 (Wet/Dry) was considered less socially acceptable than Systems 3 and 4 (and was ranked second lowest) due to concerns about residents' willingness to pay higher taxes, potential difficulties of residents in using wet/dry carts and concerns about participation levels. Although it was considered more flexible (with a wider range of materials, including organics) than either Systems 3 or 4, System 5 was ranked third highest overall, as flexibility is the least important criterion.

Systems 1 (Existing), 2 (Existing/Committed) and 6B (Mixed Waste Processing with high quality compost) each received a combination of a top and lowest ranking for performance and reliability. Systems 1 and 2 are considered very reliable but achieved the lowest diversion of all systems. System 6B is limited by its reliance on a technology that is widely used but still causes technical problems. It was therefore ranked lowest for reliability, although it achieved highest diversion of all systems. System 2 was considered more socially acceptable than most systems (ranked second highest) but was not considered very flexible and was ranked third lowest overall.

Systems 1 and 6B were not considered to be very socially acceptable. Because System 1 will not encourage significant participation it was ranked third highest for social acceptability while System 6B, which will impose a high tax increase and may cause odour and vermin problems was ranked lowest. System 6B was ranked highest for flexibility, and System 1 was ranked lowest (with the narrowest range of materials collected). Because this criterion is considered of least importance, and taking into account the significant difference in diversion, the systems were considered to be equal, and ranked second lowest overall.

In comparison, System 6A was ranked lowest overall. It achieves lower diversion than System 6B and shows the same concerns about technology problems (reliability) and potential odour and vermin problems. It was therefore ranked lowest for both social acceptability and reliability. Although it was also considered most flexible (accepting a wide range of materials) this criterion is considered of least importance and it was ranked lowest overall.

13.6 Residential Systems for Region of Peel

Table 13.6 presents the comparative evaluation of residential systems for the Region of Peel for the Service Criteria Group. It summarizes system ranking by service criterion, and overall residential system ranking for Service for the Region of Peel.

13.6.1 Reliability

Since the technology has been proven (specifically for the Region of Peel) and the systems are diverse, Systems 1 and 2 (Existing and Existing/Committed) were ranked equal and highest for reliability.

Systems 3 and 4 (Direct Cost and Expanded Blue Box respectively) were ranked equally at second highest. System 3 (Direct Cost) is based on a proven approach however it is also based, to a degree, on reliance on a single approach (i.e. economic incentives to increase voluntary source separation by residents). System 4 (Expanded Blue Box) is also based on proven technology. Peel residents are presently participating in a partially expanded program

TABLE 13.6

REGION OF PEEL

COMPARATIVE EVALUATION OF RESIDENTIAL SYSTEMS FOR SERVICE

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Third highest**	**Second highest**	**Highest**	**Third lowest**	**Lowest**	**Lowest**
Reliability	**Highest due to:** • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	**Highest due to:** • technologies presently exist and are proven • system is not prone to failure by relying on single approach • relies on integration of several approaches • relies on willingness of residents to participate	**Second highest due to:** • technologies presently exist and are proven • success relies on economic incentive to increase voluntary source separation by single-family residents • relies also on integration of social approaches	**Second highest due to:** • technologies presently exist and are proven • Peel residents presently participating in successful partially • relies on increased public participation achieved through extensive education and promotion • also relies on integration of several approaches	**Second lowest due to:** • some Peel residents participated in a Wet/Dry pilot project • technology proven at small scale in North America and at larger scale in Europe • effect of failure is significant as handling of 3 streams are linked in one system. However not readily prone to failure • relies on increased public participation to effectively source separate residential waste into three streams • increased public participation achieved through extensive promotion/education	**Lowest due to:** • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation	**Lowest due to:** • technology widely used but experiences on-going operating problems • relies on processing of third bag of waste • secondary materials recovered from mixed waste processing and composting plant likely to be of lower quality • approach does not encourage additional source separation
Flexibility	**Lowest due to:** • existing infrastructure handles limited range and quantity of materials • organic materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited	**Second lowest due to:** • existing infrastructure handles limited range and quantity of materials • wet materials diverted through either separate leaf and yard waste collection or limited distribution of backyard composters • very limited flexibility for diversion of food waste • ability to divert waste from multi-family homes limited but 3Rs regulations require service • new recycling centres provide additional opportunity to divert/re-use range of materials • partially expanded range of materials will be maintained	**Third lowest due to:** • existing infrastructure handles limited range and quantity of materials • very compatible with existing/ committed system • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	**Third highest due to:** • collects wider range and higher quantities of materials • compatible with and expands on existing/ committed system • depends on homeowner for success • wet materials diverted through either separate leaf and yard waste collection or extensive distribution of backyard composters • limited flexibility for distribution of food but enhanced by extensive distribution/promotion of backyard composters and on-site composting in multi-family buildings • ability to divert waste from multi-family homes limited but 3Rs regulations require service	**Second highest due to:** • collection of wider range and greater quantities of materials (including wet organic waste and others not captured in residential Blue Box programs) • new MRF and new centralized compost plant required to accommodate increased range and quantities of materials • requires fundamental change (modified source separation) to existing system for residential participation (essential to success)	**Highest due to:** • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality doesn't meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters	**Highest due to:** • ability to handle full range of wastes generated • provides ability to divert both wet organic and dry wastes • very compatible with existing collection system • can divert more multi-family waste than other systems • compost quality unlikely to meet Ontario guidelines for unrestricted use • additional organic materials diverted through backyard composters

Table 13.6 (cont'd)

Goal/Criteria Group/Criteria	System 1 Existing	System 2 Existing Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6A Mixed Waste Processing (low quality compost)	System 6B Mixed Waste Processing (high quality compost)
SERVICE:							
Service	**Second lowest**	**Third highest**	**Second highest**	**Highest**	**Third lowest**	**Lowest**	**Lowest**
Performance	**Lowest due to:** • limited waste diversion of 19% to 22% by the year 2000	**Second lowest due to:** • limited waste diversion of 25% to 28% by the year 2000	**Third lowest due to:** • estimated waste diversion of 37% to 40% by the year 2000	**Third lowest due to:** • estimated waste diversion of 38% to 41% by the year 2000	**Second highest due to:** • estimated waste diversion of 51% to 54% by the year 2000 • significant diversion of food waste (69%)	**Second highest due to:** • estimated waste diversion 55% to 58% by the year 2000 • limited source separation may decrease marked value of secondary materials • significant diversion of food waste	**Highest due to:** • estimated waste diversion of 74% to 77% by the year 2000 • significant diversion of food waste • limited source separation may decrease marked value of secondary materials • significant diversion of food waste
Social Acceptability	**Highest ranked due to:** • maintains existing 3Rs participation as residents and municipalities are familiar with the requirements of the System. • not likely to encourage greater individual action. • some positive attitudes and perceptions toward 3Rs activities. • residents likely willing to pay for the System (low tax increase).	**Highest ranked due to:** • potential for minor positive increase in 3Rs participation because of increased opportunities (e.g., for multi-family residences). • generally positive attitudes and perceptions toward 3Rs activities. • residents may be unwilling to pay increased costs of the System uncertain (moderate to high tax increase).	**Second highest ranked due to:** • potential for greater participation through greater source separation of materials (financial incentive); increased composting opportunities; and, greater promotion and education. • direct cost charges not implemented in most multi-family buildings; no additional incentives for these households. • difficult to implement composting in multi-family housing and unlikely to significantly increase participation (significant proportion of households in Peel). • uncertain of implementation of direct cost in rural, self haul areas. • potential for public controversy. • residents' likely to be unwilling to pay for the System (high tax increase).	**Highest ranked due to:** • potential for greater participation through: greater source separation of more materials; increased composting opportunities; greater promotion and education; and, targeting of all housing types. • positive attitudes and perceptions towards 3Rs activities because residents familiar with System requirements. • residents likely to be unwilling to pay for the System (high tax increase).	**Second lowest ranked due to:** • potential for reduced participation because of: a variety of inconveniences from collection activities and odour and health concerns related to effects from food waste composting; limited application to high-rise residences; and, uncertain application to rural residences. • potential for negative attitudes and perceptions to the System because of inconveniences and health concerns. • people are unwilling, unable or lack knowledge to source separate properly, resulting in potential for contamination of dry stream. • residents likely to be unwilling to pay for the System (high tax increase).	**Lowest ranked due to:** • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facility may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).	**Lowest ranked due to:** • potential for reduced participation because System does not encourage source separation; it could reduce participation in Blue Box and household composting activities. • people are unable, unwilling or lack knowledge to source separate properly, resulting in potential for high contamination of recyclables. • potential for negative attitudes and perceptions toward 3Rs as the mixed waste processing and composting facility may be unacceptable to residents. • residents likely to be unwilling to pay for the System (high tax increase).

which has been successful. However, it also relies extensively on a single approach (public participation) for its success.

The City of Mississauga has been a demonstration site for a wet/dry collection pilot project for some time, and has evaluated a number of methods of collecting household waste in both two and three streams. In addition, the Region of Peel is still considering the possibility of constructing a central composting facility, possibly to be shared with Region of Halton.

System 5 (Wet/Dry) is ranked second lowest because while technology is proven in smaller Canadian communities (e.g. Gold River, British Columbia) it has not been implemented in North America in an area as large as Region of Peel. It may also be limited in its ability to include multi-family buildings. Because multi-family units make up a reasonable proportion of Peel's housing stock (27.4%), this is considered a limitation of the system.

Systems 6A and 6B (Mixed Waste Processing with low and high quality finished compost) were ranked equally and lowest because they are based on a technology that is widely used but still experiences technical problems. Systems 6A and 6B rely on a single approach for the "third bag" of waste. A mixed waste processing and composting system had been proposed for "third bag" waste from Peel and possibly Halton by St. Lawrence Cement but the project was cancelled in September 1992, when incineration of municipal solid waste was banned in Ontario.

13.6.2 <u>Flexibility</u>

Systems 6A and 6B (Mixed Waste Processing with low and high quality finished compost) were ranked highest for flexibility because they can accommodate the full range and quantity of residential materials generated in Region of Peel. Both systems were judged to be compatible with the existing collection system and to lead to significantly increased waste diversion.

System 5 (Wet/Dry) was ranked second highest for flexibility as it collects a wide range and greater quantity of both dry and wet materials than Systems 1 to 4. This system has greater flexibility than Systems 1 to 4, as it can divert a significant quantity of household wet wastes.

System 4 (Expanded Blue Box) was ranked third highest. While it collects a wider range and quantity of dry materials and is compatible with the Existing/Committed system, the overall projected quantities of materials collected are lower than in some systems. It does not have the flexibility to divert significant quantities of wet materials. Region of Peel currently collects most of the list of expanded Blue Box materials, hence System 4 would not require a change in behaviour for most residents.

System 3 (Direct Cost) is ranked third lowest. It is compatible with the Existing System, but is more limited in the range of materials it diverts than Systems 4, 5 and 6. System 2 (Existing/Committed) is ranked second lowest because, while compatible with the Existing System, it will handle only a slightly increased range of materials. System 1 (Existing) is ranked lowest because it is more limited in the range and quantities of materials it diverts than other systems.

13.6.3 <u>Performance</u>

System 6B was ranked highest for performance because it significantly increases the amount of material diverted to 74% to 77% by the year 2000.

System 6A (Mixed Waste Processing with low quality finished compost) was ranked second highest with potential to divert 55% to 58% of the waste stream. System 5 is also ranked second highest with potential to divert 51% to 54%.

Systems 3 (Direct Cost) and System 4 (Expanded Blue Box) are ranked equally as third lowest, with diversion potential of 37% to 40% for System 3 and 38% to 41% for System 4.

Systems 1 (Existing) and System 2 (Existing/Committed) are ranked lowest and second lowest respectively, due to the lower level of material diverted. These systems are estimated to divert 19% to 22% (Existing) and 25% to 28% (Existing/Committed) of the residential waste stream.

13.6.4 Social Acceptability

System 1 (Existing), System 2 (Existing/Committed) and System 4 (Expanded Blue Box) were ranked highest. Peel residents are familiar with the System components and can be expected to respond more quickly and more positively to the systems. System 1 has a significantly lower tax increase per household than all other systems and it will maintain the current 3Rs behaviour and participation. However, it is unlikely to encourage greater individual or municipal behaviour to reduce, reuse and recycle waste and will not provide the same level of service to apartment buildings (through services in buildings and the recycling centres).

System 2 has a higher tax increase per household than System 1 (but lower than System 4). It will encourage greater 3Rs behaviour and provides more convenient opportunities for self-haul of recyclables than System 1. However, it does not promote reduction and reuse opportunities to the same extent as Systems 3, 4, 5 and 6. While System 4 builds on resident and municipal familiarity with the System components, Peel Region residents will likely be unwilling to pay the large tax increase in taxes per household for this System. This potential unwillingness reduces the overall acceptability of this System.

System 3 (Direct Cost) was ranked the second highest because it has the potential to encourage greater participation in 3Rs (i.e., increased composting and source separation) than System 1 (Existing) and System 2 (Existing/Committed) because of the economic incentive. However, residents will likely be unwilling to pay the large increase in taxes per household for this System; direct charges may not be implemented in multi-family buildings; and, it may be controversial in some municipalities. There is also greater possibility of negative attitudes developing as a result of illegal dumping and burning. This could reduce participation and limit the potential for a change in attitude to greater support for 3Rs. It was ranked higher than System 5 (Wet/Dry) and System 6 (Mixed Waste Processing) because it has greater potential to encourage stronger positive attitudes and behaviour toward 3Rs without the serious acceptability concerns related to facilities.

System 5 (Wet/Dry) is ranked second lowest because, although it offers greater 3Rs opportunities, its acceptability is reduced because residents may be unwilling to pay the high tax increase per household and because of odour and vermin effects from the volumes of food waste at the composting facility. There is also increased potential for some Peel Region groups to participate less due to greater difficulty in using the 90 gallon carts (e.g. elderly and disabled), and for others not to separate food waste (due to the mess and inconveniences associated with the carts). The application and acceptance of the System in apartments and rural areas is uncertain.

System 6 (Mixed Waste Processing) was ranked lowest because the mixed waste processing and composting facility operation may not be acceptable due to odour problems. Also, the

System does not encourage source separation and could encourage residents to reduce their participation in some of the components of the System (e.g., Blue Box). In addition, the very high tax increase per household will likely be unacceptable to Peel Region residents and municipalities.

13.6.5 <u>Overall System Ranking - Peel</u>

In the Region of Peel, the system ranking under the Service Criteria Grouping was:

Rank	System
Highest	System 4 - Expanded Blue Box
Second highest	System 3 - Direct Cost
Second highest	System 2 - Existing/Committed
Third highest	System 5 - Wet/Dry
Second lowest	System 1 - Existing
Second Lowest	Systems 6B - Mixed Waste Processing (high quality compost)
Lowest	System 6A - Mixed Waste Processing (low quality compost)

In the Region of Peel, System 6B (Mixed Waste Processing with high quality compost), was ranked highest for performance, but lowest for reliability. The same was true (in reverse) for the Existing system, and both were therefore eliminated from consideration as the highest ranked system.

System 4 (Expanded Blue Box) was ranked highest overall in the Region of Peel. It achieves similar diversion to System 3 (Direct Cost - ranked third lowest) and less than Systems 5 (Wet/Dry) and 6A (Mixed Waste Processing with low quality compost). It was considered as reliable as System 3 (ranked second highest) and more reliable than Systems 5 and 6A. For the top ranked criteria it was comparable to Systems 3 and 5, but it was considered more socially acceptable than either system because residents are familiar with the system and can respond more quickly. It was considered moderately flexible (ranked third highest) because it expands the range of materials collected, although not as much as Systems 5, 6A and 6B.

System 3 was ranked second highest overall. With similar diversion to System 4, and similar reliability, it is considered slightly less socially acceptable because residents may be concerned about the perception of double taxing. System 3 does not significantly expand the range of materials collected, however since flexibility is considered of lowest importance, System 3 was ranked second highest overall.

System 2 (Existing/Committed) is ranked similarly to Systems 3, 4 and 5 for the combination of the two most important criteria (performance and reliability). It is considered most reliable of all systems but achieves the second lowest diversion. This is mitigated by its high social acceptability (since residents are familiar with the system and it will cause minimal tax increases). Although it is less flexible than most systems, because it was ranked comparably on the combination of performance and reliability, higher for social acceptability and slightly lower for flexibility, it was ranked equal at second highest overall, along with System 3.

System 5 was ranked third highest overall. It was ranked second highest for performance and second lowest for reliability (similar, in reverse to Systems 3 and 4). It is considered less socially acceptable than Systems 1, 2, 3 and 4 because it will cause increased taxes and may

cause vermin and odour problems. While it is more flexible than most systems, (accepting wet and dry wastes) this criterion is considered of least importance.

Systems 1 (Existing) and 6B (Mixed Waste Processing with high quality compost) were both ranked second lowest overall. They achieved similar rankings in reverse for performance and reliability (System 1 is considered very reliable and achieves low diversion while System 6B achieves high diversion, but relies on a technology that is widely used but experiences technical problems). While System 1 is considered more socially acceptable it takes a much narrower range of materials than System 6B. They were therefore considered equal.

In comparison, System 6A achieves lower diversion than System 6B and is also considered less reliable and socially acceptable than other systems. While it is as flexible as System 6B, with lower overall diversion, System 6A was ranked lowest overall.

13.7 IC&I Systems for the GTA

In the majority of text and tables IC&I Systems 3, 4 and 5 are referred to by abbreviated names (Extended 3Rs, Expanded 3Rs and Expanded 3Rs with Organics, respectively).

Table 13.7 presents a comparative evaluation of GTA IC&I Systems and summarizes system ranking by Service criterion, and overall system ranking for Service. The system ranking is discussed below for the four service criteria used for IC&I system evaluation. Overall system ranking for Service is discussed in section 13.7.5.

13.7.1 Reliability

Since the variety of technologies within System 1 (Existing) have been proven (specifically for the GTA), it is ranked highest with respect to reliability. System 2 (Existing/Committed) was ranked highest since it relies on the same variety of systems, and existing facilities are likely to be capable to scale up to handle the increase in diverted materials.

Systems 3, 4 and 5 (Extended 3Rs, Expanded 3Rs and Expanded 3Rs with Organics respectively) were ranked second and third highest, and second lowest respectively for reliability. System 3 (Extended 3Rs) relies on the same variety of technologies as System 2 (Existing/Committed) but the amount of materials handled will be significantly greater. Also, the effect of extensive 3Rs regulations is not proven in any other jurisdiction at this time. System 4 (Expanded 3Rs) is also based on proven technology, but the scale is increased over Systems 2 and 3. Source separation and processing of some materials (such as some plastics), is not proven on a large scale. System 5 (Expanded 3Rs with Organics) is ranked second lowest since it builds on Systems 3 and 4 and also requires technology to handle and process organics. The technology for processing organics is proven in North America but there are some on-going operational problems, generally related to odours and finished compost quality and markets.

System 6 (No Unprocessed Waste to Landfill) was ranked lowest because it requires the variety of technologies required in Systems 3, 4 and 5 (at a somewhat larger scale) but also additional technologies to process the more varied waste stream involved (e.g. facilities handling and processing mixed dry IC&I wastes).

13.7.2 Flexibility

System 1 (Existing) was ranked lowest for flexibility. System 6 (No Unprocessed Waste to Landfill) was ranked highest, as it handles the full range of IC&I waste materials generated within GTA. System 6 therefore potentially handles the greatest amount and the greatest range of materials. Systems 2 through 5 were ranked in ascending order. These systems

TABLE 13.7

GREATER TORONTO AREA
IC&I SYSTEMS RANKING SUMMARY FOR SERVICE

Goal/Criteria Group/Criteria	IC&I System 1 Existing	IC&I System 2 Existing/ Committed	IC&I System 3 Extended 3Rs Regulations (90% Cut-off)	IC&I System 4 Expanded 3Rs Regulations	IC&I System 5 Expanded 3Rs Regulations with Organics	IC&I System 6 No Unprocessed Waste to Landfill
SERVICE:						
Service	Lowest	Third highest	Second Highest	Highest	Second lowest	Lowest
Reliability	**Highest due to:** • Technologies presently exist and are proven • Technologies rely on voluntary source separation and recovery of recyclables	**Highest due to:** • Technologies presently exist and are proven • Impacts of 3Rs regulations proven in Rhode Island, N.Y. • Success is partially dependent on the extent to which institutions are covered by 3Rs regulations which is limited to the largest generators • Incremental impact of 3Rs regulations on waste diversion expected to be minor due to coverage • Success also depends on voluntary source separation and recovery of recyclables • Success depends to some extent on effective monitoring and follow-up to ensure compliance (no specific measures to ensure compliance) effective source separation and diversion	**Second highest due to:** • Technologies presently exist and are proven • Success depends on effective design of regulations to identify and regulate generators who generate most (90%) of IC&I waste • Impacts of extensive 3Rs regulations not demonstrated • Effective monitoring and follow-up required to ensure compliance and effective source separation and diversion • Some technical limitations on handling some materials such as plastics	**Third highest due to:** • Technologies presently exist and are proven • Success depends on effective design of regulations to identify and regulate generators who generate most (90%) of IC&I waste • Impacts of extensive 3Rs regulations covering a wider range of mandated materials not demonstrated • Effective monitoring and follow-up required to ensure compliance and effective source separation and diversion • Some technical limitations on handling some materials particularly plastics	**Second lowest due to:** • Technologies presently exist and are proven • Success depends on effective design of regulations to identify and regulate generators who generate most (90%) of IC&I waste • Impacts of extensive 3Rs regulations covering a wide range of dry materials, and also wet materials not demonstrated • Effective monitoring and follow-up required to ensure compliance and effective source separation and diversion • Potential problems of storage for some generators of wet organics particularly small generators of food wastes	**Lowest due to:** • System builds on existing/committed source separation requirements • Technologies presently exist to process most, but not all, materials • May not be proven at large scale (approach used in Minnesota) • Uncertainty regarding how requirement would be met by private sector companies • Some technical limitations on processing some materials particularly plastics • Depends on effective flow control to achieve high diversion

Table 13.7 (cont'd)

Goal/Criteria Group/Criteria	IC&I System 1 Existing	IC&I System 2 Existing/ Committed	IC&I System 3 Extended 3Rs Regulations (90% Cut-off)	IC&I System 4 Expanded 3Rs Regulations	IC&I System 5 Expanded 3Rs Regulations with Organics	IC&I System 6 No Unprocessed Waste to Landfill
SERVICE:						
Service	Lowest	Third highest	Second Highest	Highest	Second lowest	Lowest
Flexibility	**Lowest due to:** • Limited range and quantity of materials recovered • Range and quantity of materials diverted depends entirely on voluntary commitment • very limited diversion of organics	**Second lowest due to:** • Range of dry materials handled are defined by 3Rs regulations according to IC&I sector and are limited • Both range and quantity of materials diverted depend on the coverage of the 3Rs regulations which is limited to the largest generators • Increased processing capacity will be provided by private sector • very limited diversion of organics	**Third lowest due to:** • Designed to divert virtually all of the most easily recovered and marketable dry materials • Both range and quantity of materials are defined by the extended 3Rs regulations which limited to the largest generators • Increased processing capacity may be required and will be provided by private sector • some technical limitations for processing and recycling some materials become more significant • very limited diversion of organics	**Third highest due to:** • Collects wider range of dry materials • Designed to divert virtually all of the major waste materials except wet organics • Increased processing capacity may be required and will be provided by private sector • some technical limitations for processing and recycling some materials become more significant • very limited diversion of organics	**Second highest due to:** • Designed to divert virtually all of the major waste materials including wet organics • Increased processing capacity may be required for both wet and dry wastes, and will be provided by private sector • some technical limitations for processing and recycling some materials become more significant	**Highest due to:** • Designed to recover virtually all recyclables • Increased processing capacity may be required for wet, dry specialized (eg C&D) and mixed wastes • Markets will govern materials recovered in processing and effective diversion • Some technical limitations on processing some materials, particularly plastics
Performance	**Lowest due to:** • Limited waste diversion of 28-33%	Lowest due to: • Limited waste diversion potential of 30% to 35% and 34% to 39% (low and high estimates of number of amount of IC&I waste stream subject to regulations respectively)	Second lowest due to: • Estimated waste diversion potential of 46% to 51%	Second highest due to: • Estimated waste diversion potential of 54% to 59%	Highest due to: • Estimated waste diversion potential of 60%-65% • significant diversion of IC&I organics	Highest due to: • Estimated waste diversion potential of up to 62%-67% • significant diversion of IC&I organics

Table 13.7 (cont'd)

Goal/Criteria Group/Criteria	IC&I System 1 Existing	IC&I System 2 Existing/ Committed	IC&I System 3 Extended 3Rs Regulations (90% Cut-off)	IC&I System 4 Expanded 3Rs Regulations	IC&I System 5 Expanded 3Rs Regulations with Organics	IC&I System 6 No Unprocessed Waste to Landfill
SERVICE:						
Service	**Lowest**	**Third highest**	**Second Highest**	**Highest**	**Second lowest**	**Lowest**
Social Acceptability	**Second lowest ranked due to:** • low potential for participation • operators appear willing to pay for voluntary measures • potential for voluntary compliance by those not regulated	**Second highest ranked due to:** • low potential for participation • small IC&I generators not significantly affected by regulations • potential increase in employee and corporate pride • potential for IC&I willingness to pay; some major IC&I generators currently implement regulations • generally limited negative attitudes to System.	**Highest ranked due to:** • potential for greater participation • many small operators will be required to comply; smallest operators not required to participate • potential for negative attitudinal effect by some IC&I generators because of increased regulation; potential for increase in employee pride • increase in cost of compliance	**Highest ranked due to:** • potential for greater participation • many small operators will be required to comply; smallest operators not required to participate • potential for negative attitudinal effect by some IC&I generators because of increased regulation; potential for increase in employee pride • increase in cost of compliance	**Second lowest ranked due to:** • potential for greater participation • potential negative attitudes from grocery and restaurant sector • all but smallest operators required to participate • cost of compliance higher for small IC&I generators with more effects on grocery and restaurant sector; health and customer issues with restaurants due to storage and sorting food waste • potential for non-compliance	**Lowest ranked due to:** • potential for maximum participation as the entire IC&I sector is required to participate • costly to implement with significant cost of compliance for small to medium size public and independent private operators • potential for non-compliance • potential for negative attitudes and perceptions.

handle an increasing range and/or quantity of materials, progressing from Systems 1 through 6. Systems 1 to 4 concentrate on diverting an increasing variety of dry materials. System 5 is ranked higher than Systems 1 to 4 because it processes and diverts both dry and wet streams.

13.7.3 Performance

Systems 5 (Expanded 3Rs with Organics) and 6 (No Unprocessed Waste to Landfill) were ranked highest for performance because they are estimated to divert the greatest quantity of material from disposal (60% to 65% and 62% to 67% respectively). Systems 1 (Existing) and 2 (Existing/Committed) were ranked lowest as they divert the least material from disposal. A diversion rate of 28% to 33% is estimated for the Existing System. A diversion rate of 30% to 35% is estimated for the Existing/Committed System at 40% coverage and a diversion rate of 34% to 39% is estimated at 60% coverage.

System 3 (Extended 3Rs) was ranked second lowest with potential diversion estimated at 46% to 51%). System 4 was ranked second highest with potential diversion of 54% to 59%.

13.7.4 Social Acceptability

Systems 3 (Extended 3Rs Regulations) and 4 (Expanded 3Rs Regulations) were ranked the highest. System 3 has the primary advantage of requiring a much higher level of participation (approximately 70% of all IC&I generators) than Systems 1 and 2, the same as System 4, slightly less than System 5 and moderately less than System 6. The Systems do not require the smallest operators, who are likely to have the greatest difficulty in implementing the regulations, to comply. System 4 has the same components as System 3, but expands the list of dry recyclables. The effects of this System are similar to System 3, but with some potentially increased costs to generators.

The disadvantages of Systems 3 and 4 are that some smaller businesses, industries and institutions will need to comply with the regulations, with the possibility of negative attitudes and perceptions by owners/managers and increased costs for the operators. These negative attitudes and perceptions will be focused primarily on the regulation for mandatory separation. It is assumed that these generators will have the option of either source separating or contracting a collection service that will separate the materials at the dry waste processing facility. Having the option to choose may improve its acceptability. The Systems may also encourage growth in employee pride and enthusiasm for 3Rs.

System 2 (Existing/Committed) was ranked second highest. It has the second least potential for participation. Small IC&I operators will not be significantly affected by this System and it is expected to be less costly to generators than Systems 3 - 6, with a resulting greater willingness to pay and more positive attitudes and perceptions on the part of the IC&I sector.

Systems 1 (Existing) and 5 (Expanded 3Rs Regulations with Organics) were ranked equally as the second lowest. System 1 has the least potential for increased participation. Public and private operators appear willing to pay the current costs for waste management. System 5 has a slightly greater potential for participation than Systems 3 and 4 (much greater than System 1), but the effect of the mandatory separation of wet waste is likely to elicit negative attitudes from the restaurant and grocery sector because of potential health, odour and vermin concerns and added costs for clients. System 5 is likely to apply to many small operators/owners in the restaurant and grocery sector, where compliance might be very difficult.

System 6 (No Unprocessed Waste to Landfill) was ranked the lowest because, although it will have the greatest participation, it is likely to be the most costly for individual operators to implement and will affect the entire IC&I sector. It is likely to have particularly negative effects on small and medium sized businesses and institutions, as they may need additional storage space and staff time to source separate. They will also pay proportionally more than larger operators for a hauler to separate the materials. There will likely be negative attitudes towards this System. All generators will be covered by the legislation and there is likely to be greater problems in obtaining compliance.

13.7.5 Overall System Ranking

The IC&I system ranking under the Service Criteria Grouping was:

Rank	System
Highest	System 4 - Expanded 3Rs Regulations
Second highest	System 3 - Extended 3Rs Regulations
Third highest	System 2 - Existing/Committed
Second lowest	System 5 - Expanded 3Rs Regulations with Organics
Lowest	System 1 - Existing
Lowest	System 6 - No Unprocessed Waste to Landfill.

Of the IC&I Systems, System 4 (Expanded 3Rs Regulations) was ranked highest overall. It was very similar to System 3 (Extended 3Rs Regulations) on the top three ranked criteria: performance, reliability and social acceptability. In the top three criteria, Systems 3 and 4 received one ranking each of highest, second and third highest. Specifically, both were ranked highest for social acceptability. System 4 achieved second highest diversion and was ranked third highest for reliability, while System 3 achieved third highest diversion and was ranked second highest for reliability.

System 4 was considered third most flexible because it is designed to process virtually all dry recyclables and was therefore ranked highest overall. System 3 is third least flexible with a narrower range of dry materials collected than System 4 (collecting most of the materials that can be easily collected and marketed). System 3 is therefore ranked second highest overall.

System 2 (Existing/Committed) was ranked third highest overall. Along with System 1 (Existing), it was most reliable (because technologies exist and are widely proven) but achieves lowest diversion. This was similar (in reverse) to System 5 (Expanded 3Rs Regulations with Organics) which is considered second least reliable due to increased unpredictability because of the wider range of materials (including organics) that are collected and because it relies heavily on effective regulations and compliance monitoring.

System 5 is considered less socially acceptable than System 2 (due to potentially high costs of compliance for small IC&I generators and negative attitudes). System 2 which was second most socially acceptable (considered likely to be acceptable to most IC&I generators), and second least flexible. Flexibility is considered the least important criterion, and System 2 was therefore ranked third highest overall. Because System 5 was considered second most

flexible while System 1 was considered least flexible, System 5 was ranked second lowest overall, and System 1 was ranked lowest.

System 6 (No Unprocessed Waste to Landfill) was also ranked lowest overall. While it achieved the highest diversion, it was considered least socially acceptable and reliable of all systems. It was considered most flexible, although this criterion is considered least important. It was therefore ranked equally with System 1 as lowest overall.

14.0 SUMMARY OF NET EFFECTS

The results of the assessment and evaluation of the residential 3Rs systems with respect to Service are summarized in Table 14.1 for the four GTA Regions.

Table 14.1

Summary of Residential 3Rs System Rankings for Service by Region

Region	System 1 Existing	System 2 Existing/ Committed	System 3 Direct Cost	System 4 Expanded Blue Box	System 5 Wet/Dry	System 6(A) Mixed Waste Processing (low quality compost)	System 6(B) Mixed Waste Processing (high quality compost)
Durham	Second lowest	Second lowest	Second highest	Highest	Third highest	Lowest	Second lowest
Metro Toronto	Second lowest	Third lowest	Second highest	Highest	Third highest	Lowest	Second lowest
York	Second lowest	Third lowest	Second highest	Highest	Third highest	Lowest	Second lowest
Peel	Second lowest	Second highest	Second highest	Highest	Third highest	Lowest	Second lowest

System ranking was the same in all Regions, with System 4 (Expanded Blue Box) being the highest ranked, System 3 (Direct Cost) the second highest ranked and System 5 (Wet/Dry) the third highest ranked. System 6B and System 1 were second lowest ranked and System 6A was lowest ranked in all Regions. System 2, the Existing/Committed System, was the only system whose ranking varied from one Region to another. This is generally related to the fact that commitments vary from one Region to another.

Residential System 4 (Expanded Blue Box) was ranked highest for Service in all GTA regions. It was considered highly socially acceptable and reliable, moderately flexible. It had lower potential diversion than Systems 5 and 6, but higher potential diversion than Systems 1 and 2 and similar diversion potential to System 3.

Residential System 3 (Direct Cost) and System 5 (Wet/Dry) were ranked second highest and third highest respectively for Service in all GTA regions. System 3 was generally considered highly socially acceptable and reliable, with lower potential diversion than other systems and less flexibility (through the narrower range of materials collected than Systems 4 to 6). System 5 achieves high potential diversion in all regions and was considered flexible (with the wider range of materials collected, including organics). However, it was generally considered less socially acceptable and less reliable than Systems 1 to 4, because it relies heavily on public participation and a significant change in residents' waste management activities to successfully achieve high diversion.

Residential System 2 ranged between an overall ranking of second highest (in Peel Region), second lowest (in Durham Region) and third lowest (in Metro Toronto and York Region). System 2 was considered most reliable (along with System 1) in all regions. The Existing/Committed Systems have potential for lowest or second lowest diversion in all Regions. Flexibility rankings ranged from least to second least flexible (in Peel and Metro

Toronto, a slightly expanded range of materials are collected in comparison with the Existing System). These systems also ranged from most (in Peel Region - due to significant potential for changes in behaviour) to third most socially acceptable (in Durham - due to low potential for increasing participation). System 2 was considered second most socially acceptable in York Region and Metro Toronto.

Residential Systems 1 (Existing) and 6B (Mixed Waste Processing with high quality compost) were ranked equally as second lowest for Service in all GTA regions. System 1 (in each region) was considered very reliable and was ranked high for social acceptability, however, the Existing System in all cases achieves lowest diversion and was not considered flexible. In contrast, System 6B achieves the greatest diversion and was the most flexible, but was also considered least reliable and socially acceptable.

Residential System 6A (Mixed Waste Processing with low quality compost) was ranked equally and lowest for Service in all GTA regions. The System achieves high diversion and was considered very flexible, but was not considered reliable or socially acceptable.

The results of the assessment and evaluation of the IC&I 3Rs systems with respect to Service are summarized in Table 14.2 for the entire GTA. A full explanation of the rationale for these rankings is presented in Section 13.7.5.

Table 14.2

Summary of IC&I 3Rs System Rankings for Service

Region	System 1 Existing	System 2 Existing/ Committed	System 3 Extended 3R Regulations	System 4 Expanded 3Rs Regulations	System 5 Expanded 3Rs Regulations with Organics	System 6 No Unprocessed Waste to Landfill
GTA	Lowest	Third highest	Second highest	Highest	Second lowest	Lowest

15.0 REGIONAL WASTE DIVERSION PROJECTIONS

15.1 Introduction

There are a number of possible combinations of residential and IC&I systems which could be considered, and the diversion achieved in each Region will depend on which residential and IC&I system combination is implemented. This chapter presents estimates of the cumulative waste diversion potentially achievable in the Regions of Durham, Metro Toronto, York and Peel for the years 1996 to 2015. The range of potential diversion has been estimated by combining each of five residential systems (the Existing/Committed plus four others) with each of five IC&I systems (the Existing/Committed plus four others). The Existing residential and IC&I systems were not included in this assessment, as the Existing/Committed systems will be in place by 1996.

The approach to these estimates is presented below.

15.2 Residential Waste Diverted

Estimates of residential waste diverted include residential waste reduced and residential waste reused/recycled. Estimates of residential waste reused/recycled by six residential systems are presented in Chapters 6 to 9 of this report.

A conservative source reduction estimate increasing from 0% in 1992 to approximately 3% by the year 2000, and 8% by 2015 was applied to the residential waste generation estimates developed in Chapter 3 of this document. This value compares to objectives set or met in other jurisdictions in North America (see Schedule B on source reduction).

The residential waste diversion estimates developed for each region, for each residential diversion system for each year from 1996 to 2015 are presented in Schedules to this appendix as follows:

• Region of Durham	Schedule I;
• Metro Toronto	Schedule J;
• Region of York	Schedule K;
• Region of Peel	Schedule L.

15.3 IC&I Waste Diverted

Projections of quantities of IC&I waste generated from the year 1996 to the year 2015 for each GTA region and for the entire GTA are presented in Table 11.4 of Chapter 11 of this Appendix. A source reduction allowance was also applied to these estimates to identify the potential quantities of waste which will not be generated by the IC&I sector. The method used to estimate source reduction of IC&I waste is described in Chapter 12 of this Appendix. The source reduction allowance increased from 0% in 1992 to approximately 5% by the year 2000 and 17.2% by 2015.

Estimated diversion rates for each of the six IC&I systems considered in this study are presented in Chapter 12. These are combined with source reduction estimates to determine the total quality of IC&I waste which would be diverted by each system in each Region (except Halton) for the planning period from 1996 to 2015. For the purpose of developing estimates of IC&I waste diverted and disposed under the Existing/Committed System, calculations were based on the 60% coverage scenario explained in Chapter 12.

Estimates of the amount of IC&I waste diverted and requiring disposal for each GTA Region (except Halton) for the years 1996 to 2015 are presented in Schedule N.

15.4 Regional Diversion Estimates

Chapters 6 to 9 and 12 discussed diversion estimates for six residential and six IC&I waste diversion systems in the GTA regions. The actual disposal requirements for each Region could vary depending on which residential and IC&I systems are combined to form any Regional waste diversion system. Any of the five alternative residential systems (Existing/Committed, Direct Cost, Expanded Blue Box, Wet/Dry, and Mixed Waste Processing) could be combined with any of the five potential IC&I systems (Existing/Committed, Extended 3Rs Regulations, Expanded 3Rs Regulations, Expanded 3Rs Regulations with Organics, and No Unprocessed Waste to Landfill). This results in 25 possible combinations of residential and IC&I systems for each Region.

The cumulative tonnes of waste diverted through reduction and reuse/recycling, and the cumulative diversion (expressed as a percentage of total waste generated) achieved during the twenty year period from 1996 to 2015 was estimated for the 25 potential system combinations for each of the three service areas (Durham, Metro/York, and Peel). Where low and high diversion scenarios were estimated for the residential Mixed Waste Processing System, the percentage diversion, and the cumulative tonnes reduced and reused/recycled were estimated for each case. Tables 15.1 to 15.5 show the results of this analysis for the regions of Durham, Metro Toronto, York, Metro and York combined, and Peel. The results are discussed on a Regional basis in sections 15.4.1 to 15.4.5.

The source reduction assumptions used in each residential and IC&I system are the same. Therefore the cumulative twenty year reduction of approximately 8% will be the same for all system combinations on a Regional basis. The small difference in the cumulative source reduction estimate from one Region to another is related to differences in the population and employment growth profiles among the Regions. For presentation purposes, all estimates are rounded off to the nearest whole number.

The resulting 20 year cumulative diversion estimates are discussed by Region in the following sections.

15.4.1 <u>Cumulative Diversion Estimates for Region of Durham</u>

Table 15.1 shows that the 25 combinations of residential and IC&I systems are estimated to divert a range of 4.05 million to 7.59 million tonnes of waste in Region of Durham between 1996 and 2015. This represents a range of 38% to 72% of the Durham waste stream.

The combination of Existing/Committed residential (System 2) and Existing/Committed IC&I (System 2) is estimated to result in the lowest potential waste diversion for this Region. This combination is estimated to divert 38% of the combined waste stream generated (4 million tonnes) between 1996 and 2015, achieved by the year 2015, consisting of:

- 3.18 million tonnes (30%) of waste reused/recycled;
- 0.86 million tonnes (8%) of waste reduced.

Other combinations of residential and IC&I systems are estimated to achieve higher diversions. The highest estimated diversion is achieved by combining Mixed Waste Processing of residential waste (Residential System 6A and 6B) with a policy of No Unprocessed Waste to Landfill for IC&I waste (IC&I System 6). This combination is

Table 15.1
Region of Durham
Summary of Diversion Data for
Combinations of Residential and IC&I Systems

Scenario		Cumulative Diversion (2015)					
		Reduction		Reuse/Recycling		Total Diversion	
Residential	IC&I	%	tonnes (millions)	%	tonnes (millions)	%	tonnes (millions)
Existing/ Committed	Existing/ Committed	8%	0.86	30%	3.18	38%	4.05
	Extended 3Rs	8%	0.86	37%	3.87	45%	4.73
	Expanded 3Rs	8%	0.86	41%	4.35	49%	5.21
	Expanded 3Rs with Organics	8%	0.86	45%	4.72	53%	5.58
	No Unprocessed Waste to Landfill	8%	0.86	45%	4.79	54%	5.65
Direct Cost	Existing/ Committed	8%	0.86	35%	3.71	43%	4.58
	Extended 3Rs	8%	0.86	42%	4.40	50%	5.27
	Expanded 3Rs	8%	0.86	46%	4.88	55%	5.74
	Expanded 3Rs with Organics	8%	0.86	50%	5.25	58%	6.11
	No Unprocessed Waste to Landfill	8%	0.86	51%	5.32	59%	6.19
Expanded Blue Box	Existing/ Committed	8%	0.86	36%	3.76	44%	4.62
	Extended 3Rs	8%	0.86	42%	4.45	50%	5.31
	Expanded 3Rs	8%	0.86	47%	4.92	55%	5.79
	Expanded 3Rs with Organics	8%	0.86	50%	5.29	58%	6.16
	No Unprocessed Waste to Landfill	8%	0.86	51%	5.36	59%	6.23
Wet/Dry	Existing/ Committed	8%	0.86	40%	4.23	48%	5.10
	Extended 3Rs	8%	0.86	47%	4.92	55%	5.79
	Expanded 3Rs	8%	0.86	51%	5.40	59%	6.26
	Expanded 3Rs with Organics	8%	0.86	55%	5.77	63%	6.63
	No Unprocessed Waste to Landfill	8%	0.86	55%	5.84	64%	6.70
Mixed Waste Processing	Existing/ Committed	8%	0.86	42% 49%	4.41 5.12	50% 57%	5.27 5.98
	Extended 3Rs	8%	0.86	48% 55%	5.10 5.81	57% 63%	5.96 6.67
	Expanded 3Rs	8%	0.86	53% 60%	5.57 6.28	61% 68%	6.44 7.15
	Expanded 3Rs with Organics	8%	0.86	56% 63%	5.94 6.65	65% 71%	6.81 7.52
	No Unprocessed Waste to Landfill	8%	0.86	57% 64%	6.01 6.73	65% 72%	6.88 7.59

Notes:
1. Low and High diversion estimates are shown for the Mixed Waste Processing System representing the cases when compost is landfilled and when it is marketed.

estimated to divert between 65% and 72% of the combined waste stream (between 6.88 to 7.59 million tonnes) in the twenty year period. The range relates to the quality of the finished compost from the mixed waste plant, and whether it meets MOEE compost quality guidelines.

Of the 25 system combinations considered, 19 are estimated to divert at least 50% of waste generated over the 20 year planning period. Another 2 system combinations are estimated to divert 48% or 49% of the total waste stream. Almost one fifth (8% of the waste stream) of the diversion is estimated to occur through source reduction, which requires a sustained promotion, education, and support program focussed on source reduction by both the residential and IC&I sectors.

15.4.2 Cumulative Diversion Estimates for Metro Toronto

Table 15.2 shows that the 25 combinations of residential and IC&I systems are estimated to divert a range of 19.75 million to 40.38 million tonnes of waste in Metro Toronto between 1996 and 2015. This represents a range of 34% to 70% of the Metro Toronto waste stream.

The combination of Existing/Committed Residential (System 2) and Existing/Committed IC&I (System 2) is estimated to result in the lowest potential waste diversion for this Region. This combination is estimated to divert 34% of the combined waste stream generated (19.75 million tonnes) between 1996 and 2015 consisting of:

- 15.02 million tonnes (26%) of waste reused/recycled;
- 4.73 million tonnes (8%) of waste reduced.

Other combinations of residential and IC&I systems are estimated to achieve higher diversions. The highest estimated diversion is achieved by a combination of Mixed Waste Processing of residential waste (Residential System 6A and 6B) with a policy of No Unprocessed Waste to Landfill for IC&I waste (IC&I System 6). This combination is estimated to divert between 62% and 70% (between 35.71 to 40.38 million tonnes) in the twenty year period. The range relates to the quality of the finished compost from the mixed waste plant, and whether it meets MOEE compost quality guidelines.

Of the 25 system combinations considered, 13 are estimated to divert at least 50% of waste generated over the 20 year planning period. An additional 4 system combinations are estimated to divert 48% or 49% of the total waste stream. Almost one fifth (8% of the waste stream) of the diversion is estimated to occur through source reduction, which requires a sustained promotion, education, and support program focussed on source reduction by both the residential and IC&I sectors.

15.4.3 Cumulative Diversion Estimates for Region of York

Table 15.3 shows that the 25 combinations of residential and IC&I systems are estimated to divert a range of 7.62 million to 14.04 million tonnes of waste in Region of York between 1996 and 2015. This represents a range of 38% to 71% of the Region of York waste stream.

The combination of Existing/Committed Residential (System 2) and Existing/Committed IC&I (System 2) is estimated to result in the lowest potential waste diversion for this Region. This combination is estimated to divert 38% (7.62 million tonnes) of the waste generated between 1996 and 2015, consisting of:

Table 15.2
Metro Toronto
Summary of Diversion Data for
Combinations of Residential and IC&I Systems

Scenario		Cumulative Diversion (2015)					
		Reduction		Reuse/Recycling		Total Diversion	
Residential	IC&I	%	tonnes (millions)	%	tonnes (millions)	%	tonnes (millions)
Existing/ Committed	Existing/ Committed	8%	4.73	26%	15.02	34%	19.75
	Extended 3Rs	8%	4.73	32%	18.63	41%	23.37
	Expanded 3Rs	8%	4.73	37%	21.13	45%	25.87
	Expanded 3Rs with Organics	8%	4.73	40%	23.07	48%	27.80
	No Unprocessed Waste to Landfill	8%	4.73	41%	23.45	49%	28.18
Direct Cost	Existing/ Committed	8%	4.73	30%	17.06	38%	21.79
	Extended 3Rs	8%	4.73	36%	20.67	44%	25.41
	Expanded 3Rs	8%	4.73	40%	23.17	49%	27.91
	Expanded 3Rs with Organics	8%	4.73	44%	25.11	52%	29.84
	No Unprocessed Waste to Landfill	8%	4.73	44%	25.49	53%	30.22
Expanded Blue Box	Existing/ Committed	8%	4.73	31%	17.91	39%	22.64
	Extended 3Rs	8%	4.73	38%	21.52	46%	26.25
	Expanded 3Rs	8%	4.73	42%	24.02	50%	28.75
	Expanded 3Rs with Organics	8%	4.73	45%	25.96	53%	30.69
	No Unprocessed Waste to Landfill	8%	4.73	46%	26.34	54%	31.07
Wet/Dry	Existing/ Committed	8%	4.73	36%	20.50	44%	25.23
	Extended 3Rs	8%	4.73	42%	24.11	50%	28.84
	Expanded 3Rs	8%	4.73	46%	26.61	55%	31.34
	Expanded 3Rs with Organics	8%	4.73	50%	28.55	58%	33.28
	No Unprocessed Waste to Landfill	8%	4.73	50%	28.93	59%	33.66
Mixed Waste Processing	Existing/ Committed	8%	4.73	39% 47%	22.55 27.22	48% 56%	27.28 31.95
	Extended 3Rs	8%	4.73	46% 54%	26.16 30.83	54% 62%	30.90 35.57
	Expanded 3Rs	8%	4.73	50% 58%	28.66 33.33	58% 66%	33.40 38.07
	Expanded 3Rs with Organics	8%	4.73	53% 61%	30.60 35.27	62% 70%	35.33 40.00
	No Unprocessed Waste to Landfill	8%	4.73	54% 62%	30.98 35.65	62% 70%	35.71 40.38

Notes:
1. Low and High diversion estimates are shown for the Mixed Waste Processing System representing the cases when compost is landfilled and when it is marketed

Table 15.3
Region of York
Summary of Diversion Data for
Combinations of Residential and IC&I Systems

Scenario		Cumulative Diversion (2015)					
		Reduction		Reuse/Recycling		Total Diversion	
Residential	IC&I	%	tonnes (millions)	%	tonnes (millions)	%	tonnes (millions)
Existing/ Committed	Existing/ Committed	8%	1.68	30%	5.94	38%	7.62
	Extended 3Rs	8%	1.68	37%	7.44	46%	9.12
	Expanded 3Rs	8%	1.68	43%	8.48	51%	10.16
	Expanded 3Rs with Organics	8%	1.68	47%	9.29	55%	10.96
	No Unprocessed Waste to Landfill	8%	1.68	48%	9.44	56%	11.12
Direct Cost	Existing/ Committed	8%	1.68	34%	6.80	43%	8.48
	Extended 3Rs	8%	1.68	42%	8.30	50%	9.98
	Expanded 3Rs	8%	1.68	47%	9.34	55%	11.02
	Expanded 3Rs with Organics	8%	1.68	51%	10.15	59%	11.82
	No Unprocessed Waste to Landfill	8%	1.68	52%	10.30	60%	11.98
Expanded Blue Box	Existing/ Committed	8%	1.68	34%	6.85	43%	8.53
	Extended 3Rs	8%	1.68	42%	8.35	50%	10.03
	Expanded 3Rs	8%	1.68	47%	9.39	56%	11.07
	Expanded 3Rs with Organics	8%	1.68	51%	10.19	60%	11.87
	No Unprocessed Waste to Landfill	8%	1.68	52%	10.35	61%	12.03
Wet/Dry	Existing/ Committed	8%	1.68	38%	7.65	47%	9.32
	Extended 3Rs	8%	1.68	46%	9.15	54%	10.83
	Expanded 3Rs	8%	1.68	51%	10.19	60%	11.86
	Expanded 3Rs with Organics	8%	1.68	55%	10.99	64%	12.67
	No Unprocessed Waste to Landfill	8%	1.68	56%	11.15	65%	12.83
Mixed Waste Processing	Existing/ Committed	8%	1.68	39% 45%	7.78 8.87	48% 53%	9.46 10.54
	Extended 3Rs	8%	1.68	47% 52%	9.28 10.37	55% 61%	10.96 12.04
	Expanded 3Rs	8%	1.68	52% 57%	10.32 11.40	60% 66%	12.00 13.08
	Expanded 3Rs with Organics	8%	1.68	56% 61%	11.13 12.21	64% 70%	12.80 13.89
	No Unprocessed Waste to Landfill	8%	1.68	57% 62%	11.28 12.37	65% 71%	12.96 14.04

Notes:
1. Low and High diversion estimates are shown for the Mixed Waste Processing System representing the cases when compost is landfilled and when it is marketed

- 5.94 million tonnes (30%) of waste reused/recycled;
- 1.68 million tonnes (8%) of waste reduced.

Other combinations of residential and IC&I systems are estimated to achieve higher diversions. The highest estimated diversion is achieved by combining Mixed Waste Processing of residential waste with a policy of No Unprocessed Waste to Landfill for IC&I waste (System 6). This combination is estimated to divert between 65% and 71% of the waste stream (12.96 to 14.04 million tonnes) in the twenty year period. The range relates to the quality of the finished compost from the mixed waste plant, and whether it can be classified for unrestricted use.

Of the 25 system combinations considered, 19 are estimated to divert at least 50% of waste generated over the 20 year planning period. Almost one-fifth (8% of the waste stream) of the diversion is estimated to occur through source reduction, which requires a sustained promotion, education, and support program which focusses on source reduction by both the residential and IC&I sectors.

15.4.4 Cumulative Diversion Estimates for Metro Toronto and Region of York Combined

Table 15.4 shows that the 25 combinations of residential and IC&I systems are estimated to divert a range of 27.37 million to 54.43 million tonnes of waste in Metro Toronto and Region of York combined between 1996 and 2015. This represents a range of 35% to 70% of the combined waste stream from the two Regions, which make up one service area.

The combination of Existing/Committed Residential (System 2) and Existing/Committed IC&I (System 2) is estimated to result in the lowest waste diversion for this combined service area. This combination is estimated to divert 35% of the waste generated (27.37 million tonnes) between 1996 and 2015, consisting of:

- 20.96 million tonnes (27%) of waste reused/recycled;
- 6.41 million tonnes (8%) of waste reduced.

Other combinations of residential and IC&I systems are estimated to achieve higher diversions. The highest estimated diversion is achieved by combining Mixed Waste Processing of residential waste with a policy of No Unprocessed Waste to Landfill for IC&I waste (System 6). This combination is estimated to divert 63% to 70% of the combined waste stream (48.67 to 54.43 million tonnes) in the twenty year period. The range relates to the quality of the finished compost from the mixed waste plant, and whether it meets MOEE compost quality guidelines.

Of the 25 system combinations considered, 16 are estimated to divert at least 50% of waste generated over the 20 year planning period. Almost one fifth (8% of the waste stream) of the diversion is estimated to occur through source reduction which requires a sustained promotion, education, and support program focussed on source reduction by both the residential and IC&I sectors.

15.4.5 Cumulative Diversion Estimates for Region of Peel

Table 15.5 shows that the 25 combinations of residential and IC&I systems are estimated to divert a range of 8.79 million to 17.14 million tonnes of waste in Region of Peel between 1996 and 2015. This represents a range of 36% to 70% of the Region of Peel waste stream.

Table 15.4
Metro Toronto and Region of York Combined
Summary of Diversion Data for
Combinations of Residential and IC&I Systems

Scenario		Cumulative Diversion (2015)					
		Reduction		Reuse/Recycling		Total Diversion	
Residential	IC&I	%	tonnes (millions)	%	tonnes (millions)	%	tonnes (millions)
Existing/ Committed	Existing/ Committed	8%	6.41	27%	20.96	35%	27.37
	Extended 3Rs	8%	6.41	34%	26.08	42%	32.49
	Expanded 3Rs	8%	6.41	38%	29.62	47%	36.02
	Expanded 3Rs with Organics	8%	6.41	42%	32.36	50%	38.77
	No Unprocessed Waste to Landfill	8%	6.41	43%	32.90	51%	39.30
Direct Cost	Existing/ Committed	8%	6.41	31%	23.86	39%	30.27
	Extended 3Rs	8%	6.41	38%	28.98	46%	35.39
	Expanded 3Rs	8%	6.41	42%	32.52	50%	38.92
	Expanded 3Rs with Organics	8%	6.41	46%	35.26	54%	41.67
	No Unprocessed Waste to Landfill	8%	6.41	46%	35.80	55%	42.20
Expanded Blue Box	Existing/ Committed	8%	6.41	32%	24.76	40%	31.16
	Extended 3Rs	8%	6.41	39%	29.87	47%	36.28
	Expanded 3Rs	8%	6.41	43%	33.41	52%	39.82
	Expanded 3Rs with Organics	8%	6.41	47%	36.15	55%	42.56
	No Unprocessed Waste to Landfill	8%	6.41	47%	36.69	56%	43.10
Wet/Dry	Existing/ Committed	8%	6.41	36%	28.14	45%	34.55
	Extended 3Rs	8%	6.41	43%	33.26	51%	39.67
	Expanded 3Rs	8%	6.41	48%	36.80	56%	43.21
	Expanded 3Rs with Organics	8%	6.41	51%	39.54	59%	45.95
	No Unprocessed Waste to Landfill	8%	6.41	52%	40.08	60%	46.48
Mixed Waste Processing	Existing/ Committed	8%	6.41	39% 47%	30.33 36.09	48% 55%	36.74 42.49
	Extended 3Rs	8%	6.41	46% 53%	35.45 41.20	54% 62%	41.86 47.61
	Expanded 3Rs	8%	6.41	50% 58%	38.99 44.74	59% 66%	45.39 51.15
	Expanded 3Rs with Organics	8%	6.41	54% 61%	41.73 47.48	62% 70%	48.14 53.89
	No Unprocessed Waste to Landfill	8%	6.41	55% 62%	42.27 48.02	63% 70%	48.67 54.43

Notes:
1. Low and High diversion estimates are shown for the Mixed Waste Processing System representing the cases when compost is landfilled and when it is marketed

Table 15.5
Region of Peel
Summary of Diversion Data for
Combinations of Residential and IC&I Systems

Scenario		Cumulative Diversion (2015)					
		Reduction		Reuse/Recycling		Total Diversion	
Residential	IC&I	%	tonnes (millions)	%	tonnes (millions)	%	tonnes (millions)
Existing/ Committed	Existing/ Committed	8%	1.84	28%	6.95	36%	8.79
	Extended 3Rs	8%	1.84	36%	8.69	43%	10.53
	Expanded 3Rs	8%	1.84	40%	9.89	48%	11.73
	Expanded 3Rs with Organics	8%	1.84	44%	10.82	52%	12.66
	No Unprocessed Waste to Landfill	8%	1.84	45%	11.00	53%	12.84
Direct Cost	Existing/ Committed	8%	1.84	32%	7.92	40%	9.76
	Extended 3Rs	8%	1.84	39%	9.66	47%	11.50
	Expanded 3Rs	8%	1.84	44%	10.86	52%	12.70
	Expanded 3Rs with Organics	8%	1.84	48%	11.79	56%	13.63
	No Unprocessed Waste to Landfill	8%	1.84	49%	11.97	56%	13.81
Expanded Blue Box	Existing/ Committed	8%	1.84	33%	8.09	41%	9.93
	Extended 3Rs	8%	1.84	40%	9.82	48%	11.66
	Expanded 3Rs	8%	1.84	45%	11.03	53%	12.86
	Expanded 3Rs with Organics	8%	1.84	49%	11.96	56%	13.80
	No Unprocessed Waste to Landfill	8%	1.84	50%	12.14	57%	13.98
Wet/Dry	Existing/ Committed	8%	1.84	37%	8.95	44%	10.79
	Extended 3Rs	8%	1.84	44%	10.69	51%	12.52
	Expanded 3Rs	8%	1.84	49%	11.89	56%	13.73
	Expanded 3Rs with Organics	8%	1.84	52%	12.82	60%	14.66
	No Unprocessed Waste to Landfill	8%	1.84	53%	13.00	61%	14.84
Mixed Waste Processing	Existing/ Committed	8%	1.84	39% / 46%	9.60 / 11.24	47% / 54%	11.44 / 13.08
	Extended 3Rs	8%	1.84	46% / 53%	11.34 / 12.98	54% / 61%	13.17 / 14.82
	Expanded 3Rs	8%	1.84	51% / 58%	12.54 / 14.18	59% / 66%	14.38 / 16.02
	Expanded 3Rs with Organics	8%	1.84	55% / 62%	13.47 / 15.12	63% / 69%	15.31 / 16.95
	No Unprocessed Waste to Landfill	8%	1.84	56% / 63%	13.65 / 15.30	63% / 70%	15.49 / 17.14

Notes

1. Low and High diversion estimates are shown for the Mixed Waste System representing the cases when compost is landfilled and when it is marketed

The combination of Existing/Committed Residential (System 2) and Existing/Committed IC&I (System 2) is estimated to result in the lowest potential waste diversion for this Region. This combination is estimated to divert 36% of waste generated (8.79 million tonnes) between 1996 and 2015, consisting of:

- 6.95 million tonnes (28%) of waste reused/recycled;
- 1.84 million tonnes (8%) of waste reduced.

Other combinations of residential and IC&I systems are estimated to achieve higher diversions. The highest estimated diversion is achieved by combining Mixed Waste Processing of residential waste (System 6A and 6B) with a policy of No Unprocessed Waste to Landfill for IC&I waste (System 6). This combination is estimated to divert between 63% and 70% (15.49 to 17.14 million tonnes) of the combined waste stream in the twenty year period. The range relates to the quality of the finished compost from the mixed waste plant, and whether it meets MOEE compost quality guidelines.

Of the 25 system combinations considered, 16 are estimated to divert at least 50% of waste generated over the 20 year planning period. Two additional system combinations are estimated to divert 48% of the total waste stream. A portion (8% of the waste stream) of the diversion is estimated to occur through source reduction, which requires a sustained promotion, education, and support program focussed on source reduction by both the residential and IC&I sectors.

15.5 Conclusion

The diversion impacts of a range of residential and IC&I systems were estimated for the three service areas for which landfills are proposed by the Interim Waste Authority. The estimates show that of the 25 combinations considered, at least 16 are estimated to divert 50% or more of the generated waste stream in the 20 year period between 1996 and 2015. All estimates have assumed that up to one-fifth of the diversion will be achieved through source reduction by the residential and IC&I sectors. A sustained promotion, education and support program for source reduction would help achieve this result.

The actual level of waste diversion achieved in each of the primary service areas will be influenced by a number of factors including the diversion approach pursued in each Region as well as external influences. These external influences will impact on both the generation and diversion of waste by the residential and IC&I sectors. The external influences include factors such as economic growth, our international competitiveness, the value of the Canadian dollar, the continued availability of an inexpensive export option for waste disposal, and the creation of stable sustainable end markets for secondary materials.